September, 1943

EDISON ELECTRIC INSTITUTE BULLETIN

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PUBLISHED MONTHLY BY EDISON ELECTRIC INSTITUTE

THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

June, 1943

	1943	1942	%
	SOURCE AND DISPOSAL OF ENERGY		
GENERATION* (Net)			
By Fuel Burning Plants	11,592,600,000	9,830,600,000	+17.9
By Water Power Plants	6,482,400,000	5,352,300,000	+21.1
Total Generation	**18,075,000,000**	**15,182,900,000**	**+19.0**
Add—Net Imports Over International Boundaries	139,740,000	128,900,000	+ 8.4
Less—Company Use	235,930,000	177,800,000	+32.7
Less—Energy Used by Producer	698,195,000	300,000,000	+132.7
Net Energy for Distribution	**17,280,615,000**	**14,834,000,000**	**+16.5**
Losses and Unaccounted for	2,040,476,000	2,164,132,000	− 5.7
Sales to Ultimate Customers	**15,240,139,000**	**12,669,868,000**	**+20.3**
	CLASSIFICATION OF SALES		
NUMBER OF CUSTOMERS—As of June 30th			
Residential or Domestic	26,784,456	26,373,143	+ 1.6
Rural (Distinct Rural Rates)	1,077,839	1,097,666	.....
Commercial or Industrial:			
Small Light and Power	4,160,406	4,297,159	− 3.1
Large Light and Power	146,426	148,930	
Other Customers	118,291	121,241	.....
Total Ultimate Customers	**32,287,418**	**32,638,139**	**+ 0.8**
KILOWATTHOUR SALES—During Month of June			
Residential or Domestic	2,240,956,000	2,025,125,000	+10.7
Rural (Distinct Rural Rates)	299,004,000	270,229,000	+10.6
Commercial or Industrial:			
Small Light and Power	2,385,007,000	2,160,341,000	+10.4
Large Light and Power	8,800,847,000	7,194,286,000	+22.3
Street and Highway Lighting	138,423,000	131,668,000	+ 5.1
Other Public Authorities	743,251,000	313,480,000	+137.1
Railways and Railroads:			
Street and Interurban Railways	354,531,000	324,886,000	+ 9.1
Electrified Steam Railroads	200,261,000	183,626,000	+ 9.1
Interdepartmental	77,859,000	66,227,000	+17.6
Total to Ultimate Customers	**15,240,139,000**	**12,669,868,000**	**+20.3**
Revenue from Ultimate Customers	**$251,565,700**	**$227,056,600**	**+10.8**
AVERAGE CUSTOMER DATA—For the 12 Months Ended June 30th	**RESIDENTIAL OR DOMESTIC SERVICE (Revised Series)**		
Kilowatthours per Customer	1,044	1,009	+ 3.5
Average Annual Bill	$38.21	$37.23	+ 2.6
Revenue per Kilowatthour	3.66¢	3.69¢	− 0.8

**By courtesy of the Federal Power Commission.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 11 SEPTEMBER, 1943 No. 9

These Rosy Dreams of the Future

History Indicates Caution on Pollyanna Prospects and Promises

By William M. Carpenter

Economist, Edison Electric Institute

UNLIKE former occasions, when the expansion of trade was the keynote of progress, the present post-war outlook centers largely upon the betterment of personal living standards and the improvement of the home itself. All of this contemplates the introduction of new devices, many of them electrical, to whose more glamorous aspects much publicity is being directed. As a result, the outlook for the electric light and power industry during the immediate post-war years is becoming the subject of a steadily increasing confusion. Intrigued by the possibilities of the extraordinary technical progress of recent years, the public has lost sight of the fact that all permanent change comes slowly, that the momentum is so great that fundamental trends still persist, and that most of these new discoveries are competitive, either with each other or with existing applications—and all of them are more efficient.*

Unless planning rests upon a solid foundation of common sense, the public, oversold on the future, will inevitably react in a disappointment and will look around for someone to blame. Without in any way wishing to detract from the necessity of clear sighted and logical planning, the author here presents some historical data with the suggestion that the fruit of the future is conditioned by the seeds of the past, so that the interested reader may make his own projections of the fundamental trends and arrive at his own conclusions.

* There is, for instance, talk of a new refrigerant which will produce the same heat transfer with one-third less power. If this were introduced into all existing units, it would offset all gains resulting from the complete equipment of every home with a refrigerator. Similarly, television is expected to grow mightily; but to see the image at its best, all lights have to be turned out.

The Factor of National Prosperity

The condition of national prosperity is the "X," or unknown quantity, in all forecasts. Its ups and downs since the last war are shown by Fig. 1 and the annual averages appear in Table II. The author does not attempt to evaluate it except to point out that national prosperity has always followed certain definite cyclical trends whose constants and periodicities could be determined with tolerable accuracy once one complete cycle had elapsed; that the last war engendered such cycles and these persisted right up to the outbreak of the present struggle regardless of all planning and action by the Federal Government; and

TABLE I—ESTIMATED EXPENDITURES FOR DOMESTIC ELECTRIC APPLIANCES*

1925	$550,000,000
1926	625,000,000
1927	700,000,000
1928	1,025,000,000
1929	1,350,000,000
1930	1,025,000,000
1931	725,000,000
1932	475,000,000
1933	535,000,000
1934	650,000,000
1935	875,000,000
1936	1,175,000,000
1937	1,300,000,000
1938	800,000,000
1939	1,000,000,000
1940	1,300,000,000
1941	1,625,000,000
1942	485,000,000

* Socket-attached household appliances and bulbs only; does not include lamp fixtures and wiring, or farm machinery, pumps, etc.

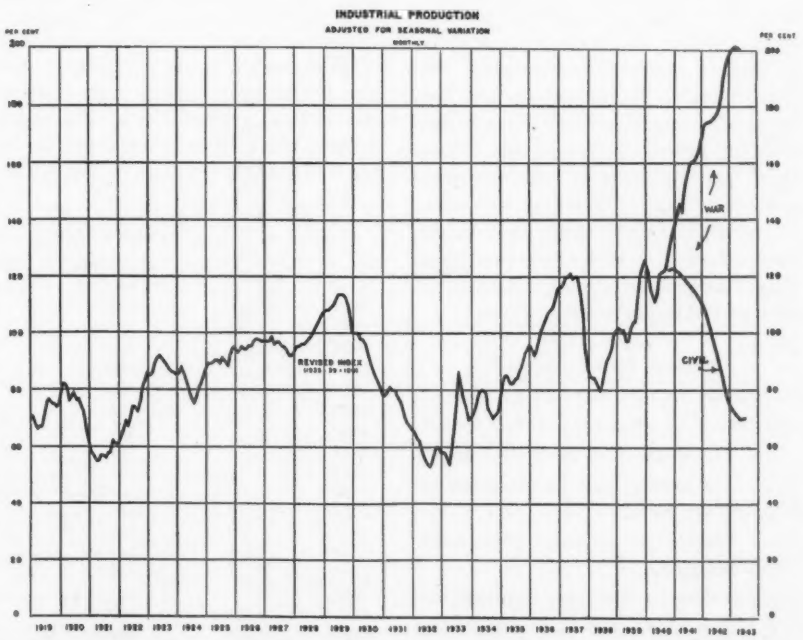

Fig. 1—The Federal Reserve Board's Index of Industrial Production.

The entire effect of the NRA was the short-lived peak in the summer of 1933. In spite of all the concentrated planning in Washington, the depression returned exactly on schedule in 1937. If it had not been for the war, another major depression would have taken place in 1943.

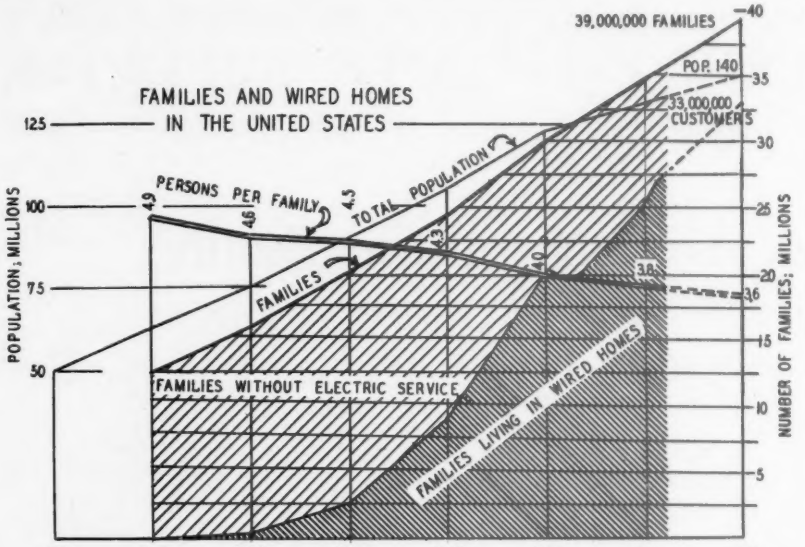

Fig. 2—Families and Wired Homes in the U. S. A.

The extensions to 1950 in the above chart make the fundamental assumptions that by that time the period of reconversion and readjustment will have been completed and that the more immediate of the post-war problems will have been satisfactorily settled. It assumes that the 8 or 9 million men now with the armed forces and the additional 6 million men and women released by industrial demobilization will have found sufficient re-employment and that the present million of migrant families will have been able to stabilize their lives and find new homes. In other words, it takes for granted the optimum conditions during a period of extreme uncertainty and—above all—it makes the further assumption that this readjustment will not only produce no social upheaval, but even no political policies which will jeopardize American property rights or business initiative.

Fig. 3—Ratio of Residential and Farm Customers to total number of families. The exuberance of the 20's righted itself in 1932.

that it is still too early to determine whether the present war has produced a new set of phenomena and, if so, what their constants and periodicities may be. It may be suggested, nevertheless, that the arbitrary selection of certain high levels of business activity for post-war planning just for the reason that, if these levels are not attained, unemployment and other undesirable events will ensue, is largely wishful thinking. It is evident, however, that the level of prosperity will have a large bearing on the future volume of residential electric service.

Domestic Electric Service**

The use of electricity in the home is determined obviously by three factors:

a) The number of electrified homes.

b) The average volume of electric appliances per home.

c) The degree to which these appliances are used.

Each of these has a definite historical record whose trends can be evaluated and extended.

** Including rural and farm homes. Unfortunately the statistical series have been upset by the separation of some rural home use into different classifications.

Number of Electrified Homes

The number of homes depends, not upon the population, but on the number of *families,* which, in turn, is a function of the size of the family. This latter has been decreasing for many years and the very evident relationship of this index to many of the social phenomena of the day is beyond the province of this discussion. It is evident, however, that it makes for smaller houses, for less responsibility upon the head of the house and therefore for more impermanent and less secure homes. Fig. 2 shows the record up to 1943 and the probable projection to 1950. Fig. 3 shows the number of electrified homes expressed as a ratio of the total number. This follows a normal growth curve, which because it is the result of deep-seated forces acting over a period of years, is only temporarily distorted by current conditions of national prosperity.

Volume of Electric Appliances

Through the annual tabulations published by *Electrical Merchandising,* it is now possible to estimate the total sales of appliances over a considerable period of years. This is shown in Table I, which makes a generous allowance for

TABLE II—DOMESTIC ELECTRIC APPLIANCES*

Year	*Kwhr used per Customer*	*Investment per Customer*	*Kwhr per $1 Invested*	*F.R.B. Index of Production*
1924	378	$135.00	2.80	82
1925	398	150.50	2.64	90
1926	430	166.50	2.58	96
1927	446	181.00	2.46	95
1928	463	210.50	2.20	99
1929	502	255.50	1.98	110
1930	547	284.75	1.92	91
1931	583	305.00	1.91	75
1932	601	318.00	1.89	58
1933	600	323.75	1.85	61
1934	629	327.50	1.92	75
1935	677	334.00	2.03	87
1936	735	349.75	2.10	103
1937	805	367.50	2.19	113
1938	853	368.25	2.32	89
1939	897	367.50	2.44	108
1940	952	380.00	2.51	123
1941	986	397.75	2.48	156
1942	1,022	393.00	2.60	181
1943 (est.)	1,050	375.00	2.80	200

* See footnote to Table I.

unreported items. Subtracting each year an amount to cover the probable replacements, a figure can be arrived at which will represent the cumulative investment of the domestic consumer in socket-attached electric appliances. When divided by the number of consumers, this gives the investment of the average household. Its relationship to the annual use of electricity and to the level of general prosperity is shown by Table II, which indicates some rather surprising things.

Appliance Use Depends Upon Consumer's Prosperity

It is now a generally accepted fact that the relative degree of national prosperity has a controlling effect upon the use of industrial electricity. The author here suggests that it has also a much greater effect upon the use of electricity in the home than has generally been supposed and submits several charts to illustrate this point.

Fig. 4 shows the growth of the household consumer's investment in electric appliances. In this, the contribution of the radio from 1927 to 1931 is striking. In late years, however, this curve has tended to stabilize along the average line shown on the chart.

The interesting point, however, is the relationship of the use per $1 of appliance investment to the general level of business activity since 1928. This is shown by Fig. 5 which suggests a definite straight-line relationship. If this is true, the question of rates has but little effect upon appliance use: people buy appliances because they want them and have the money (actual or prospective) to pay for them and they use electricity freely when times are good and less freely when they are bad. But, while they are likely to continue to do so, it is quite evident that they can be hindered by extravagant promises and helped by sane merchandising policies.

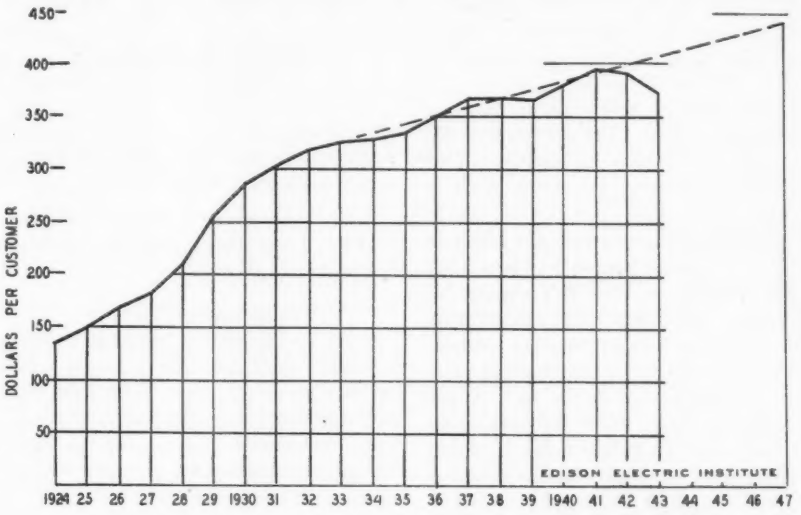

Fig. 4—Average Investment of the American Home in Electric Appliances.

(Socket-attached household appliances and bulbs only. Does not include wiring or lighting fixtures, motor driven tools or farm machinery, pumps, etc.) The decline in 1942-1943 is not so much the reflection of the wearing out of equipment as it is the mathematical result of the addition of a million and a half new customers at a time when new appliances have been unavailable.

Forecasting the Future

It remains for the reader, therefore, to make up his mind where the Index of Industrial Production of the Federal Reserve Board will be at any given year in the future and then to apply this to the various trend lines shown on these charts. Unless the reader wishes, in addition, to assume a complete break from past history, this appears to be the only way by which a rational figure for electric sales can be obtained.

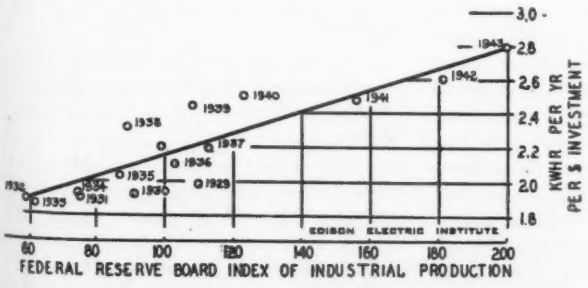

Fig. 5—Relationship of the Use of Domestic Electric Appliances to the General Level of Prosperity.

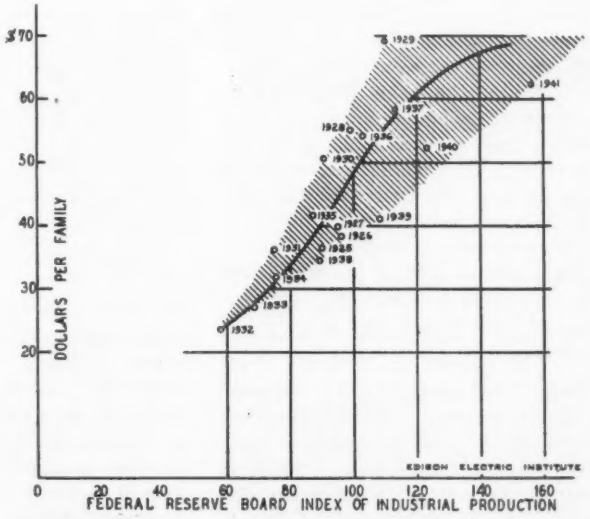

Fig. 6—Annual Expenditures Per Home for Household Electric Appliances Compared With General Business Activity.

Because of the unavailability of appliances, no figures are shown for 1942 and 1943. The curved line is the average of the several points.

System-Voltage Control in the War Emergency

By A. E. Silver
Ebasco Services, Incorporated

Paper presented at a Joint Meeting of Electrical Equipment Committee and Transmission and Distribution Committee, EEI Chicago, Ill., May 11, 1943

THE problem of voltage control on any power system has been ever present, dealt with from the beginning of the system, and I can say little that will be new to anyone here. Nevertheless, the passing of time reduces practice to a matter of habit, and, in the present emergency where it is mandatory to push existing facilities for increased duty, I believe there is ample reason for a fresh review of ideas and practices in this matter of system-voltage control. Even though there may be a good understanding of the factors involved in system-wide voltage control, I have the conviction that in actually carrying on, there are situations where full advantage of this knowledge is not being taken.

The early conception of system-voltage planning was largely that of working from the generating station outward to the extremities. It is only natural then that this approach to voltage-control practices became habitual in many situations, and not surprising that, even today, there may be some generating-station superintendents who take pride in pointing to a straight-line chart of station-bus voltage and who espouse this principle of operating their station. Nevertheless, those now responsible for system-wide planning, I believe, recognize customer-service voltage as the level of reference from which to develop facilities and practices for system-wide voltage determination. Voltage profiles are projected from a maintained service-voltage level, counter to the power flow, thereby passing slack back to the generating and other power sources to be met by swinging the bus voltage.

Over the years, various technical writers have treated this system-voltage procedure. I recall an American Institute of Electrical Engineers' paper in 1927, by A. L. Harding and myself, that quite comprehensibly developed this approach from the service level. A recent treatment of the problems of system-voltage coordination, carried through in considerable quantitative detail, was presented by C. E. Arvidson at a meeting of EEI Transmission and Distribution Committee in May, 1942.

War Emergency Problems

I am not going into technical details. Instead, I shall endeavor to review typical experience that may yield some aid in a war-emergency search for additional ways of manipulating existing facilities for maintaining service voltages within permissible limits under increasing loads. At the outset, remember that pressure for conserving materials is being applied all up and down the line. It is mandatory on consumers to use higher motor loadings in relation to motor ratings; consumers' wiring is forced to greater voltage drops; utility service runs and distribution circuits are forced to heavier duties. Even ignoring load increases, all this means increased emphasis on system voltages.

Power systems vary extensively in such features as geographic spread, prevailing distance of transmission, load density, and calibre, flexibility and extent of facilities. The determining limitations, as between systems, may be quite different in nature. While sagging voltage at heavy loads may be the most frequent limitation, some systems may predominate in mileage of high-voltage transmission circuit in relation to load, making holding down of voltage at light load the critical problem, sometimes even involving electrical instability from low excitation of generators.

On some of the older systems, there still may be in use large amounts of equipment, particularly transformers and generators, designed for top voltages below the levels that constitute recognized good practice today, thus constituting a handicap in holding service voltages up to needed levels. Again, there is extensive variety among systems as to types of equipment that, in the course of the system's growing up, have been provided for purposes of voltage control. These include such as range of transformer taps and whether or not operative under load, bus-voltage regulators, synchronous condensers, individual feeder regulators, shunt reactors and shunt capacitors. A further important factor is the extent to which neighboring systems are interconnected and operating under coordinated supervision.

All this variety, in an emergency like the present, puts a bonus on ingenuity and resourcefulness in hunting down new versatilities and margins for increasing the use factor of present facilities, to the end of keeping voltages within limits necessary for adequate service. Undoubtedly, the most readily available single device for service-voltage control is the compensating or swinging of generating-station voltage with the load.

Compensated Control of Generating-Station Bus Voltage

While much has been accomplished, there still may be inertia to fully exploiting the possibilities of swinging generator-bus voltage. This may come from:

(1) Conservatism of plant operators and of manufacturers in their advice on equipment use.
(2) Insufficient courage on the part of operating engineers, perhaps due to lack of understanding of relation between nameplate ratings and safety margins in equipment.
(3) Lack of appreciation of benefits and value by some of the parties concerned.
(4) Lack of urgent incentive.

The station electrician also may have his fears since the plant motors may be subjected to wider voltage swings than any other piece of equipment on the system. Earnest acceptance of the idea of all practical compensated - voltage control for generating and other major supply stations involves getting across to all operating personnel who have a part in controlling voltage a good understanding of the functioning and benefits of the practice.

To make my meaning more definite, I will describe briefly a few examples from actual experience of Ebasco client systems.

One example is a situation embracing four systems operating interconnected, namely, those of Arkansas Power & Light Company, Louisiana Power & Light Company, Mississippi Power & Light Company, and New Orleans Public Service, Inc. These have a wide-

flung network and large mileage of 110-kv transmission circuits loaded close to practical limits. Most of the variations of geographic spread, of transmission distances, and of types of facilities, which I have previously mentioned, exist among these four systems. In 1940, loads were building up in certain areas to cause inadequate service voltages. The four companies joined in a thorough survey and analysis of existing conditions and of possibilities of better coordinated voltage control for the entire interconnected situation. Upon request, an experienced engineer of Ebasco staff was assigned to aid in organizing, carrying forward, and coordinating this work.

It was found necessary, as the first step, to reorganize and extend the means for making records of voltages and loads at various key stations throughout the networks. Then, with improved and coincident records available, there was undertaken a thoughtful study of points of stress, both from low voltage and from high voltage, with an increasing understanding of limiting factors. Close attention was given to such things as overall coordination of transformer ratios by tap adjustments, bringing voltage levels high enough so that in the load valleys synchronous condensers and regulators would operate in the buck range, switching on and off of shunt reactors existent at certain stations, working out coordinated schedules of swings for generating-station bus voltages, working closely with generating-station and substation operators to try out changes in operating schedules, watching results in voltage improvements at the distribution extremities, as well as difficulties occasioned at any points on the systems.

An early result of this survey was to emphasize the fact that a large customer located near to a key generating station was establishing a ceiling on generating-station voltage and depressing voltage levels in many of the distribution system extremities. It became evident that no more was required than a small regulator to give this critical customer a satisfactory lighting-service voltage to allow carrying generating-station voltage considerably higher at peak loads and thereby immediately lift critical service-voltage levels in wide distribution areas; also, make synchronous condensers available for bucking down these distribution-area voltages during light-load periods.

Another bottleneck was entailed in the case of a low-economy generating station feeding into the main distribution bus for the most important city on one of the systems and with this bus also served by stepdown from the transmission system. This generating station was being operated to support voltage over peak. The problem of handling reactive power in and out of this station and at the same time being able to shut down the generators off peak proved quite troublesome to solve. This led to a recommendation for installing a bus-voltage regulator.

These studies were coupled with trials of various departures in operating practices. By increasing steps, compensating voltage schedules for key generating stations were put into regular operation. A typical week-day schedule is given:

13,200	volts	— 1:00 A M	to	6:00 A M
13,500	"	— 6:00 A M	to	7:00 A M
13,800	"	— 7:00 A M	to	8:00 A M
14,000	"	— 8:00 A M	to	12:00 Noon
13,500	"	—12:00 Noon	to	1:00 P M
14,000	"	— 1:00 P M	to	5:00 P M
13,500	"	— 5:00 P M	to	6:30 P M
14,000	"	— 6:30 P M	to	11:00 P M
13,500	"	—11:00 P M	to	1:00 A M

This shows a swing at peak to more than six per cent above the bottom voltage held in the valley period. In the Sunday schedule, this swing dropped to approximately two per cent. Possibly, even greater variations are now advisable.

Many other factors came in for study and recommendation, such as shifting location of certain regulators and reactors to gain maximum usefulness, determining locations of maximum usefulness and schedules for switching on and off of several shunt reactors on the system.

The important thing emphasized by this survey is the fact that a systematic, concentrated study did largely extend compensated-voltage control at generating stations and bring out other opportunities, for sufficient improvements in voltages in the distribution extremities, to take on considerable added loads without substantial expenditures for new condensers, feeder regulators, capacitors, and the like.

Also, this situation evidences the practicability of coordinating compensated generating-station voltage control as among neighboring systems. It is usually found that system-voltage control has much in common as between systems, and that when worked out, respective system voltages may be raised and lowered together, with mutual benefits.

A *second example* is the system of the Pennsylvania Power & Light Company. This company has generously supplied a description of its voltage-control facilities and experience: "This system has a load aggregating approximately 500,000 kilowatts and serves as area extending about 140 miles east and west by an equal distance north and south in the industrial and mining sections of Northeastern Pennsylvania. It is a 'country' type of system which operates on the network principle as contrasted to the radial systems of some companies. It operates interconnected with the neighboring large systems of Philadelphia Electric Company and Public Service Electric & Gas Company and their interconnections extending to Baltimore and Washington, also with several smaller systems.

"There are six classes of voltage planes in use as networks, as follows:

(1) *120-208-Volt City Network*—Supplied from at least two interconnected sources.

(2) *2.3 and 4-Kv Service*—Supplies closely built-up areas in larger cities outside business network area and the larger towns. Most of these are operated as radial feeders, but in recent years, the circuits and automatic tie breakers have been added to form the nucleus of the 4-kv network.

(3) *11-Kv Network*—In larger cities, a 12-kv backbone system has been established. Supplies most of the industrial customers direct and also the 4-kv distribution centers throughout the area. Also used for rural developments.

(4) *22-Kv Network*—Performs essentially the same function of the 12-kv networks mentioned above, but extends over larger areas or handles heavier loads than possible at 11 kv.

(5) *66-Kv System*—This system ties together the above mentioned distribution systems. It acts in itself as a distribution system to large power customers. It acts as a medium for interchange and distribution of power throughout the territory tying in generating stations of various capacities, as well as serving as the medium of several interconnections.

(6) *220-Kv System*—Acts exclusively as a transmission system and ties this company with Philadelphia Electric and Public Service of New Jersey.

"The backbone of the system is the 66-kv network. The length of the lines between circuit-breaker substations is comparatively short, the average being about twenty miles.

"A considerable portion of the lower voltage distribution stepped down from 66 kv, especially 11 kv, is fed through networks, which allows it, in the main, to be fed from substations without regulators or other direct means of feeder-voltage control. These networks are reinforced, as increased load dictates, by additional feed-in points from higher voltage networks.

"It has been the policy extensively to utilize the scattered generating stations to regulate for service voltage, adding, as necessary, synchronous condensers and static capacitors. The introduction of these devices has been planned to provide

a kilovar-generating source in any area deficient in kilowatt generation so that, during peak loads, the actual kilowatts to the area are transmitted at near unity power factor.

"Definite operating voltage schedules are set up for the various station buses at which synchronous equipment or other voltage-regulating equipment is available, these schedules following roughly the shape of the load curves in the respective areas. At one main point of interconnection, tap-changing-under-load equipment on 220/66-kv transformers permits setting up a mutually satisfactory 66-kv bus operating-voltage schedule.

"Voltage schedules for a generating station, covering one week in mid-July, 1942, typical of those in use are here tabulated:

Week Days			
Held at 66,000 volts	12:00 Midnight	to	6:30 A M
Raising to 68,500 volts	6:30 A M	to	7:30 A M
Held at 68,500 volts	7:30 A M	to	3:00 P M
Dropping to 67,500 volts	3:00 P M	to	4:00 P M
Held at 67,500 volts	4:00 P M	to	10:30 P M
Dropping to 66,000 volts	10:30 P M	to	12:00 Midnight
Saturdays			
Held at 66,000 volts	12:00 Midnight	to	6:30 A M
Raising to 67,500 volts	6:30 A M	to	7:30 A M
Held at 67,500 volts	7:30 A M	to	11:00 P M
Dropping to 66,000 volts	11:00 P M	to	12:00 Midnight
Sundays and Holidays			
Held at 66,000 volts	12:00 Midnight	to	5:00 P M
Raising to 67,500 volts	5:00 P M	to	6:00 P M
Held at 67,500 volts	6:00 P M	to	10:30 P M
Dropping to 66,000 volts	10:30 P M	to	12:00 Midnight

NOTE: If mines work Saturday, week-day schedule is followed.

"On 66-kv and lower voltage-regulated station buses, this swinging of voltage between light and heavy-load periods results in a desired spread, of the order of five per cent. In addition to this, to some extent, voltage is regulated and reactive flow controlled by close attention to transformer-tap settings. Switching lines in and out of service also provides a possible means of controlling voltage in an area, although this method is not generally used except as a last resort in an emergency because of the additional hazard to continuity of service, and then only until equipment is restored to normal.

"During heavy-load periods, most of the synchronous equipment operates with a fairly heavy field and armature load (especially on Monday when washing-machine use is heavy). Enough leeway is left to allow for normal maintenance or emergency outages without seriously affecting operation. During light-load periods synchronous condensers are either out of service or used to buck voltage. For stability reasons, generators are not allowed to operate much above 95-per cent power factor.

"Periodic monthly 24-hour checks are made on the voltages at all attended stations and substations. Load and voltage surveys are run on distribution circuits whenever, from voltage complaints or the above check, it is evident that conditions in an area are not entirely satisfactory. Power-factor information on feeders is obtained by installation of portable demand tapes showing kilowatts and kilovars. Load power-factor surveys to give generator and tie-line power factor are run about once a year for characteristic load periods of the day. All these data contribute to a continual scrutiny of voltage schedules and methods of operation, to maintain the best practicable conditions for the maximum number served.

"This method of system-voltage control necessitates, on a distribution-station bus, a voltage curve which is a composite of the requirements of individual feeders. Current densities on individual feeders supplied from distribution buses lacking voltage-regulating equipment must not be too great. Conversion from 2.3 to 4 kv as needed, up to the present time, has enabled maintaining general overall conditions, which, while not ideal, have been acceptable.

"Operating the strong interconnections with other companies requires close co-operative attention, and has resulted in no problems that could not be solved. Power interchange is scheduled on an economy and diversity basis and, over different periods of the day, week, or season, may vary on a few of the different tie lines from large blocks of power received to large amounts delivered, depending not only on load conditions of the various systems involved but also on maintenance schedules, emergency outages, water conditions on rivers supplying run-of-stream plants, and the like. The reactive tends to flow toward the supplying system in increasing amounts as the power flow increases away from that system, so that the receiving company, having taken off non-economical generation, may find itself with a deficiency of reactive capacity. Conversely, the sending system with an excess of capacity over its own needs may become the recipient of unneeded reactive support which, in fact, may raise the generating power factor to an undesirable value.

"This Pennsylvania company considers the principal advantages of this method of system-voltage regulation to be:

(1) Over a period of years an integrated net work of high, medium and low-voltage lines has been built up, highly responsive to system-voltage control as outlined. This allows selection of proper voltage to suit the magnitude or location of load.

(2) Its simplicity due to absence of feeder regulators and their maintenance.

(3) The high level of line power factors resulting from the synchronous capacity."

A *third example* is Carolina Power & Light Company's system covering a large, thinly populated territory served by an extensive 110-kv transmission system. Due to the high ratio of transmission-line charging kvar to system off-peak load, it is necessary to use the off-peak period as a base for establishing voltage levels for all periods. This is accomplished by adjusting transformer taps at generating plants, synchronous-condenser stations, and primary substations for the highest practicable service-voltage levels during off-peak hours when minimum excitation is maintained on synchronous condensers and unity power factor on generators. The excitation of the generators and synchronous condensers of the system is then increased by the plant operators in accordance with voltage schedules arranged to fit the load envelope of the system. These schedules are under the supervision of the Load Dispatcher and are changed slightly from day to day whereas major changes follow a seasonal variation.

Under this method of voltage control, full excitation of synchronous machines is approached only during on-peak hours of dark days. Present operating criteria specify unity power factor as minimum excitation for generators, however, the advisability of lowering this value due to increased stability derived from high-speed excitation and high-speed relaying is now under considera-

tion. Maximum excitation is governed by armature temperature and field current (lacking field thermometers) as well as corona effects. For generators with corona-proof windings, armature temperature and field-current limits only are observed.

In the past, certain 110-kv transmission circuits were taken out of service during off-peak hours in order to reduce charging kva, but this practice has been discontinued on account of increased off-peak loads and to avoid jeopardizing service to customers. Typical winter schedules for voltage at a generating plant and a synchronous-condenser station are given:

Major Hydro-Electric Station

Day	*Period*	*Generator Voltage*	*Approximate Kvar Reactive*
Sunday	Midnight to Midnight	12,500	0
Monday)	Midnight to 5 A M	12,500	0
Tuesday)	5 A M to 7 A M	12,500-13,600	0-30,000
Wednesday)	7 A M to 6 P M	13,600	30,000
Thursday)	6 P M to 9 P M	14,500	46,000
Friday)	9 P M to 10 P M	14,500-13,500	46,000-30,000
	10 P M to Midnight	13,500-12,500	30,000-0
Saturday	Midnight to 6 A M	12,500	0
	6 A M to 8 A M	12,500-13,500	0-20,000
	8 A M to 10 P M	13,500	20,000
	10 P M to Midnight	13,500-12,500	20,000-0

The foregoing swing is 16 per cent above the base voltage at the bottom of the valley.

Typical Synchronous-Condenser Station—10,000 Kvar

Day	*Period*	*Kvar Reactive*
Sunday	Midnight to 8 P M	4,500 Buck
	8 P M to 10 P M	1,000 "
	10 P M to Midnight	3,000 "
Monday	Midnight to 6 A M	3,000 "
	7 A M	4,500 Boost
	8 A M to 10 P M	10,000 "
	10 P M to Midnight	6,500 "
Tuesday)	Midnight to 6 A M	4,500 Boost
Wednesday)	7 A M	6,000 "
Thursday)	8 A M to 10 P M	10,000 "
Friday)	10 P M to Midnight	6,500 "
Saturday	Midnight to 10 P M	4,500 "
	11 P M	3,000 "
	Midnight	3,000 Buck

As mentioned before, minor changes are made daily to the above schedules by Load Dispatcher in order to maintain voltage within certain limits as determined from spot checks at key points on the system. During past emergencies, the voltage at the generating station scheduled above has been carried as high as 15,000 volts, or 20 per cent above the light-load base voltage. At the present time, daily Voltage Profile Curves are in the process of inauguration, to be compiled by the Dispatcher, one curve to be at the time of maximum system load and the other curve to be at the time of minimum system load. Actual 110,000-volt readings will be used and will be taken from key points on the system. It is hoped that such Voltage Profile Curves will assist in maintaining satisfactory system voltage, also reveal other useful information.

A *fourth example* is a system comprising moderate transmission distances and an extensive urban area, where war demands rapidly brought about overload to a degree that extensive reconstruction appeared imminent. A survey showed fifty-four 4-kv feeders serving these overloaded areas, each equipped with feeder regulator, performing the function of boosting voltage not exceeding ten per cent, but constituting a bottleneck to the amount of load that could be handled. It was determined that by scheduling generating-bus voltage for approximately ten per cent variation between high and low load, these regulators could be cut out, the 4-kv circuits more heavily loaded, and service voltages still kept at acceptable levels.

All interested personnel were then called together and the picture and proposal presented. A period was given to think the matter through carefully, with a request to bring all reasonable objections into a later meeting. A few objections were offered, such as: voltage spread on plant auxiliaries, reactive-power interchange between stations, low voltage on industrials at night. These matters were tested out by trial voltage schedules, with instruments and observers. No substantial troubles developed, so that at a third meeting, it was agreed to put the procedure in effect on a permanent basis.

Incidentally, when the matter of reactive flow with an interconnected system was discussed with the neighbor dispatcher, he wanted to know why voltage was being swung. When the reasons were explained to him, he promptly passed the information to his people, who saw the benefits and themselves inaugurated the practice.

Recapitulation

To be somewhat more specific, if inadequate service-voltage levels are being encountered in taking on increased loads, there may be good possibilities of gaining substantial relief through inaugurating or increasing bus-voltage compensation at generating and major supply stations. This can be most effectively accomplished by exploring voltage conditions and versatility of voltage-control facilities available throughout the system. I am going to enumerate some of the steps as a sort of check-off list, even though familiar to most of you. Please do not infer that all of these steps are advocated for each and every case.

(1) Become definitely inquisitive and make a searching survey of factors determining voltage conditions.

(2) Take the guide from the service and distribution-voltage needs, with the objective of optimum system-wide use of voltage-control facilities.

(3) Make it a system problem competently handled, with cooperative participation of Distribution, Transmission and Generation groups.

(4) Accumulate dependable and representative voltage and load data for the systems. This may require rearranging, augmenting, and calibrating existing voltage-recording equipment.

(5) Correlate these voltage and load data and study them with ingenuity for opportunities to save. In this, the device of plotted voltage profiles is useful—the network analyzer even might be justified.

(6) Study performance of equipment to reappraise use limitations, both from overduty and from underduty, including such as:

Excitation of generators.

Excitation and tap range of transformers.

Utilization of tap-changing-under-load equipment.

Utilization of synchronous condensers for supplying both leading and lagging reactive power. This includes the pressing into duty of idle generators as synchronous condensers. (In a paper before Southeastern Electric Exchange on March 26, 1943, J. T. Logan of Georgia Power Company describes that company's accomplishment in operating steam turbo-generators as synchronous condensers, by vacuum cooling, without a maintained steam supply.)

Location and utilization of voltage regulators in both boost and buck ranges, for maximum load capacity; or reconnection, relocation or removal of those causing current-capacity bottlenecks.

Location and control of shunt reactors.

Location and control of shunt capacitors.

Internal-system and interconnection limita-

tions on system stability. (In this look carefully at any habitually detoured barrier. The emergency may supply the momentum to throw it aside.)

(7) Manufacturers' advice in normal times may have influenced quite conservative practices in equipment operation, including generator or transformer excitation. Reconsider these factors with them, for the manufacturers are keenly alive to the emergency needs and actively studying ways for taking best advantage of equipment characteristics and for safely operating equipment with closer margins.

(8) Scheme out strategic adjustments for more effective use of available margins found under (6), in dealing with voltage levels of specific areas or circuits in distress.

(9) Provide voltage coordination with interconnected neighboring systems by securing cooperation of respective operating engineers and load dispatchers. In this do not be deterred by impeding practices or agreements. More than likely, if found, these can be adjusted to mutual advantage.

(10) Develop compensated bus-voltage operating schedules for generating stations and for transmission supply stations, advising with load dispatchers and generating-station and substation operators. In some cases, bus voltage may be swung as much as ten per cent and even more.

(11) Apply corrective measures on a trial basis progressively as findings develop from investigational study. If a measure has promise, try it out, rather than prolonging debate on its feasibility. An occasional unsuccessful experiment is more than justified by the things that unexpectedly work.

(12) Sell the ideas, reasons, and benefits to all who will be party to successful carrying on, from time to time, as revised operating practices are evolved.

(13) Encourage all persons participating to offer suggestions, and give each one of these careful consideration. Continue concentrated responsibility in competent hands.

(14) Keep up the quest. Continue alert to finding ways for realizing increased versatility and use factor from each item of control equipment in dealing with each successive voltage bottleneck.

Extent of applicability of the foregoing list depends on status of accomplishment in an existing situation, and on the war-emergency necessity for short cutting.

May I say again that I am confident there are still many situations where, by expeditious attention along these lines, substantial gains can be made in ability of present facilities to maintain adequate service voltage, with negligible capital outlay and use of critical materials. Also, may I repeat my belief that compensated control or scheduling of bus voltage at generating stations still may be made to yield considerable slack that can be utilized in the war emergency.

While the necessities of the emergency may motivate this effort, the resulting benefits will carry right along as economies in post-war operation.

Rotating Electrical Machinery Standard Is Revised

AFTER six years in use, the American Standard for Rotating Electrical Machinery has now been revised to bring it up-to-date with changes in industrial practice which have taken place since the standard was originally approved in 1936. The changes incorporated in the new edition recognize for the most part practices already in effect, as well as those which have been newly developed.

The ASA Electrical Standards Committee which sponsored the work of ASA sectional committee C50 acknowledges contributions made to the work by the American Institute of Electrical Engineers, the National Electrical Manufacturers Association, and others. Much of the original early standardization work of the American Institute of Electrical Engineers remains basically unchanged in this publication, the committee announces. The test codes recently developed by the American Institute of Electrical Engineers are now made part of this standard.

The latest revisions in the standard are not extensive. The principal ones are described briefly in the following:

Definitions have been eliminated, as they are included in the American Standard Definitions of Electrical Terms (C42-1941).

The four AIEE test codes pertaining to rotating electrical machinery have been made a part of the standards by reference.

Use of the resistance method for determining temperatures has been extended by making this an alternative method for shunt field windings of direct-current machines and the windings of induction motors.

A new method of rating for intermittent, periodic, or varying duty based on recent AIEE Publication No. 1A is recognized for trial use.

The 1936 edition required the friction and windage losses, in the case of a machine furnished with incomplete bearings, to be measured with temporary bearings of the size and type normal for the machine. This requirement did not work out satisfactorily and was not followed in actual practice. Consequently, a revision has been made in the 1943 edition, omitting these losses when determining the efficiency, but providing that they be stated separately when requested by the purchaser.

Allowable variation in operating voltage five per cent above or below rated voltage is now specified for frequency changers and synchronous condensers.

Normal Wk^2 values for low speed (450 r.p.m. and lower) synchronous motors have been added as a basis for the specified minimum values of pull-in torque. The minimum values of starting, pull-in and pull-out torque previously assigned to compressor motors have been deleted and henceforth the values for standard motors generally will apply.

The previous short-circuit requirement for a synchronous machine, the purpose of which is to insure adequate mechanical construction and bracing of windings, has been found to be impractical because no reference was made to the type of fault (three-phase, line to ground, or line to line) and because serious consequences due to heating in the rotor iron may be encountered if the short circuit is held for any appreciable length of time, particularly in the case of a line-to-line fault. The new rule shortens the time of application from 30 seconds to 10 seconds and limits the current value to that of a three-phase short circuit.

Exciter losses (*i.e.*, losses in the exciting generator, not excitation losses or field losses) are not normally included with the machine losses, and this practice has not been changed except in the case of synchronous condensers, where the exciter losses are included.

Balanced and residual component telephone interference factors for synchronous generators, in agreement with the long standing NELA Publication No. 239, have been added. The subject is undergoing study, and revision in the future may be expected.

It will be noticed that a number of paragraphs pertaining to efficiency of induction machines have been deleted. The purpose of this, however, is to avoid conflict with the AIEE Test Code for Polyphase Induction Machines, which contains the detailed procedure for determining the true efficiency, taking into account stray load losses which were previously neglected.

Appendices IV, Brushes, and V, Insulation Resistance, of the 1936 edition have been deleted. The former is included in the scope of another ASA project and the latter is treated in the AIEE Test Codes.

Suggestions for revisions of the standard are invited and should be addressed to the American Standards Association.

Copies of the American Standard for Rotating Electrical Machinery (C50-1943) are available from the American Standards Association at $1.25. ASA Members are entitled to 20 per cent discount on all approved American Standards.

Electrical Renaissance at the Grass Roots

By Ashton B. Collins

AFTER Pearl Harbor, many power companies not only stopped merchandising, but withdrew sales and other contact forces and thus restricted customer contacts to a bare minimum. Now, however, most companies see a grand opportunity for more customer contacts on such matters as Home Service; Food Care and preparation; Civic Cooperation; Care and Use of Appliances; Dehydration; First-Aid; War Bonds; Nutrition Centers; Fuse replacement by customers; Red Cross, etc. They are strengthening their activities and there are several valid reasons for that, viz:

Since Pearl Harbor, the millions of outstanding appliances are 17 months older. Many dealers are going out of business. It may run as high as 50 per cent by war's end, particularly in the scattered and rural areas. Repair parts and service are more difficult. The burden is falling back on the power company, primarily.

Power Companies now are keeping an eye on the Post-War period and some even beginning to revamp their skeleton organization to that end, realizing the need for quick resumption of sales, come Peace.

Power Companies won't have to stop and re-tool after the war, like commercial concerns, but they will have to Re-package and Re-tell, and Re-sell!

The Power Business has changed tremendously from a pioneering and technical one to a sales promotion business; not just the sales of appliances, but the sales of engineering miracles from behind the outlet.

I submit to you that never again should the basic service of a Power Company be by-passed by the appliances themselves, as was permitted during the merchandising era of the 8 or 10 years before Pearl Harbor; when the institutional story of service from behind the outlet was allowed to remain hidden back of the refrigerator or range or other appliances.

With that thought in mind, I take as the subject of this paper, *Electrical Renaissance at the Grass Roots.*

I use this title:

1. Because the Power business is a local business, a *grass roots* business.

2. Because this Power business is at a critical stage in its history and seems ripe for a rebirth.

The word *Renaissance,* in Webster's New International Dictionary, has three collateral definitions:

1. A new birth or revival.

2. Any period similarly characterized by enthusiastic and vigorous activity . . . including a return to old masters for inspiration.

3. A renewal of youthful vigor, freshness, zest or productivity; a rebirth, or renewal of life.

All three furnish us a perfect platform.

My trips all around the country have created an impression with me that this industry is getting ready for a renaissance, or that enough power company individuals desire one; or else my reflection of their thinking urges the analysis I am going to offer.

So I shall address myself to the Terms, *Good-Will* and *Public Relations* though I don't like either one. I would much prefer striving for *Popular Fancy.*

I am sure that men and women of this industry are not any more satisfied than I would be merely to maintain what Good-Will this industry is supposed to enjoy; because it has been referred to as existing somewhere between 50 and 55 per cent, according to surveys made several years ago.

Let's assume that good electric service under war conditions has perhaps raised that percentage of good-will to 60 per cent. That still would be unsatisfactory.

A commercial concern might be satisfied with 60 per cent, because it does not have to face municipal elections, and a commercial concern can select its markets and its customers.

But, with only 60 per cent good-will, an unfair politician or a demagog can come along overnight and ruin much more than your 10 per cent margin with a blast of half-truths or well-timed baloney.

The demagog knocks your position into a cocked hat, and you either don't answer him or you do so with statistics or technicalities, and your answer doesn't get you anywhere.

Public Relations. I don't know who invented the term. I wonder why we have it?

Department Stores, Drug Stores, Hardware Stores, Grocery Stores don't have public relations departments. I wonder if these terms merely become attached to bigness, a bigness that we don't deserve?

After all, a Power Company is nothing but a neighborhood business anyway, though seemingly glorified with bigness. Your sales of electricity to your customers average around $3.00 per month, don't they? Then think what your drug and meat and grocery stores get each month from their customers. Aren't we pikers or small neighborhood dealers in comparison?

Nice fresh Kilowatts today, one cent each!

The public relations of these stores are automatically reflected in their sales, or rather they don't rely on public relations, they rely upon sales. But Power Company sales are more or less regular and stable. They are largely hidden and therefore cannot easily reflect themselves in public relations unless they are trotted out from behind the outlet.

And there I think we have our finger on the key to public relations. We have not trotted that great story out from behind the outlet and made it pulsate with good-will, or what I prefer to call *Popular Fancy.*

Rather than make this merely a statement of my own, I think it can best be confirmed by disconnected viewpoints, just several out of many that I have gathered:

Back in 1926, Owen D. Young made this statement:

> **"Only one danger confronts us . . . the danger is that the growth of our industry will out-run public understanding . . . that people will come to see and fear our size without understanding our service."**

That prediction came true nationally and locally, and still is true today, 17 years later.

Some months ago, *Fortune Magazine* had an article reviewing the electric industry and made one particularly pointed comment:

> **"Utilities get into lazy habits and are not on their toes and changing to meet conditions."**

And, whether we like it or not, that view probably is shared by many others.

James W. Irwin of Monsanto Chemical Company in an address at Edgewater Park, Miss., March 11, 1943, before a meeting of the National Association of Manufacturers, said in part:

"That labor had outsmarted the most brilliant brains in American industry by getting their story across to the public . . . you have manhandled one of the most important phases of your jobs . . . had you been more valuable in your relationships with your employees and your public, and more considerate and frank with the two great agencies for the dissemination of information—the press and the radio, you would not now find yourselves, as a group, sitting upon such a hot seat."

An article in *Electrical West* a year or so ago, had their muse, Electra, pondering:

"He has an interesting style, but it lacks dignity. Then I exploded, *'Dignity!* That's what afflicts most of the people who have enough sense to really know what's wrong in this country. Their manner is pompous and their talk is stilted. They'd rather lose an election than split an infinitive. That's the trouble with the electrical industry. . . . They lead the parade of progress in every respect, but they still use Victorian English when they write letters, or reports, or ads, with a public relations flavor. . . . The balance of power in America still eats in the kitchen'!"

And we know that "The man who stands constantly on his dignity is located on a mighty slippery spot."

In other words, we have improved everything about the power business except the understanding and feeling of the people.

Now, many executives in the past have felt that if we have made our service well-nigh perfect, the public will like us and vote for us, and not let others upset us. But experience proves otherwise, and the industry has been in the doghouse because of a few, isolated malefactors; and yet the industry's record of tip-top service surpasses most other industries.

One Power Company recently started its managers calling upon other business men and frankly discussing with them the free enterprise system and enlisting their support or understanding for power company service. One district manager said: "I interviewed our newspaper man and he said he thought most of the people were favorably disposed towards the Power Company but that when the local politician gave the nod, or talked against the Power Company, then the people were inclined to vote the way the politician suggested.

And surely we know that a jealous or disturbed citizen, or a selfish bond-broker seeking a commission, can pave the way for the unfair politician or the demagog who wants a political target.

So it would seem that we have one of the finest industries in the country, that we have tip-top engineering efficiency plus mechanical perfection and admittedly good service, but only 50 per cent or 60 per cent public relations that desert us in emergencies.

Now compare this 50 per cent Good-Will with the significant fact that 50 per cent of the Electric Industry's customers use 50 Kilowatt hours or less per month. In other words one half of your Customers are low-use customers. Their incomes run $1,800 a year in normal times. Eighty-five per cent of them never finished high-school. They are non-technical. But they are Customers. They are Voters. And you want and need their Good-Will! But you have less of their Good-Will than of the upper 50 per cent bracket of customers, because you have not reached them simply and understandably with your story. And they are entitled to it!

And yet we want to talk about maintaining that 50 per cent or 60 per cent Good-Will.

I call it *Good-Will o' the Wisp.* It's too mercurial. Here today and gone tomorrow.

Commercial concerns used to give *Good-Will* a fictitious value in their financial statements, but now, if shown at all, it is usually at $1.00.

We need *Showmanship and Salesmanship.* Some executives will say, *"Well, we have too many problems now to be able to reverse ourselves and put on a show!"* But I will answer like the Scotchman whose wife gave birth to triplets. Sandy had always dressed simply, almost shabbily, but now he barged out in a completely new and fancy outfit, and his best friend remonstrated and asked why just when these new responsibilities had been thrust upon him. Whereupon Sandy replied:

"Hoot mon, what's the use of trying to save now?"

Why Does the Industry Need a Rebirth of Showmanship and Salesmanship?

Well, let's take the monthly service bill, if any one thing needs a renaissance, it's that.

Most bills don't sell, they unsell! They make customers suspicious, helpless or mad.

You reduce the size and understandability of the Bill to the sacrifice of public relations, just to save several thousand dollars a year, and you turn right around and spend thousands of dollars more in advertising trying to recapture those public relations.

The monthly bill should be the finest direct-mail any Company has, because it is bound to reach each and every customer.

Let's just take the story of Rural Electrification.

Your business-managed Companies gave birth to the idea during the Spanish-American War, 45 years ago. You developed it to a Brilliant record of 1½ million electrified farms ready for this War.

Yet you let Government people come along just several years ago and steal the rural electrification show from you, and they took your money and mine to do it with. Who gets the credit and the publicity today for rural electrification? Your Companies who started it? No. REA with a good catch name and ballyhoo, although the fringe farms they are serving can't produce anywhere near what your electrified farms can produce for this war, and Food is the all-important item right now. REA meetings these days look and sound like a Billy Sunday Revival!

Why does REA get the acclaim away from you today? They dramatized their story. Two hundred and sixty-nine Congressmen come from Rural Districts. How many have you contacted since last November? How many have you kept informed as to your great service?

Your business-managed Companies years ago, took large and small communities and combined their electric services. They were charging anywhere from 20 to 30 cents per kilowatt hour for electricity, just for night time use, and you brought the rates down as low as 1 cent per kilowatt hour, for uninterrupted service.

But several years ago, along came Government people and established TVA. And who gets the credit for low cost electricity. Your Companies? No. Another Government development with the magic initials TVA.

Do they stop to explain to the public that you business men developed the industry and that they are merely copying everything that you did?

No, they just capitalize on what you did. They take your money and mine and tell a better story to today's public.

Publicity makes public relations, and TVA and REA became by-words, magic words that mean something to the public; likewise, Grand Coulee, Bonneville, etc., etc.

Business men have not learned how to get publicity. They have not learned how to make news.

But Government people are doing this while supplying only 13 per cent of the electricity of the United States, while you are furnishing 87 per cent. I wonder what kind of story they could make of it if they had the 87 per cent and you the 13 per cent.

Who's got most of the credit for the fact that there has been no shortage of electricity since Pearl Harbor. Government people again, even going so far as to say that if it were not for the Government hydro projects, the supply of electricity for war production would be "a mere trickle."

It is only recently that individual power companies in different parts of the country have begun to tell their public that the reason for today's adequate power supply was the long and splendid preparedness of the business-managed power companies.

Think what a story would have been told if this country had had 100,000 airplanes ready at Pearl Harbor, or 10,000 extra ships, or all the guns and tanks and soldiers fully equipped.

But the electric industry had all the kilowatts Uncle Sam needed, and yet the story went begging to be told.

Why? Because Power Companies had gotten out of the habit of telling their institutional service story instead of the appliance story.

And because Power Companies did not tell one story, geographic-wide.

Power Companies did a great job of interconnection, power pooling, geographically. But no one, single, dramatic story is told by the Power Companies as a group in one grass-roots section.

The public does not get one repetitive story from the Power Companies. Employees don't tell the same story in their own company territory. Companies are not telling the same story in adjoining areas. There's no regional story of the Power Company viewpoint.

You've got to match Government area stories (TVAs, AVAs, REAs, etc.), with similar stories from business-managed areas.

This business-managed industry has one-quarter million employees. Have you ever stopped to think what would happen if that army of employees were turned loose and went wild over one subject? If they did the effect would be tremendous. You could not stop them. All right. Let's apply the cycle of industry story to the personnel problem.

It too, calls for a renaissance, a rebirth of spirit, a new approach to today's problems.

As the industry grows older, executives and employees grow older with it. I am told that the average age of the men and women in the industry is over 40.

And when you have reached the age of 40 you are 1 out of 5, the other four are younger than you are.

I am not laying off on the older employees or executives. We know the value of their experience, if it is kept fresh and attuned to today's requirements. Business history is full of successes of men past 40. Outstanding are cases like Henry Ford, and Winston Churchill.

But the danger is that we in the power business outgrow our customers, whose average age is well below 30.

Power Companies today have an opportunity to revamp their personnel as never before. They have lost many men to the services. Some of them may not come back to their old positions, but may go into other businesses or locate in other sections of the country.

How many of your employees who contact the public have a right to contact that public?

The power business grew on an engineering basis. As the need for sales and other contacts developed, many of those employees were used for that purpose. They were not scientifically tested for public relations qualifications.

Employees who contact the public today should be selected in today's scientific ways. Since the last war, many industries have learned how important it is to select their people and fit square pegs into square holes.

Employees should be examined not only for their intelligence, but for their adaptability, public relations contacts, etc.

As the industry reaches 60 years of age, it must ask itself if the time has not come to revamp its personnel to meet today's requirements. You know what happened to the railroads. They got set and grooved with ageing personnel, particularly those who contacted the public.

Per contra, witness the trucking and the bus business, then the automobile business, and now aviation. Look at the average age of aviation personnel and compare it with yours.

Let's take employee information programs.

I spoke of one-quarter million employees. They must be marshalled together to tell a great story, but we can't do it with the employee information program of yesteryear. They were too detailed and factual. They must be rebuilt and revitalized, but in today's language, "Intelligent Entertainment is More Instructive than Flat Information."

You've got to "Sing Something Simple." You can't get ¼ million employees to take the whole story in detail.

I have spoken about the increasing age of personnel in the electric industry. Let me go further. I want to impress upon you this statement.

The electric industry has never addressed itself as an industry to the Youth of America. It has never sought to capture the imagination of the younger generation, the customers of Tomorrow!

This has been unfortunate. Surveys made sometime ago revealed that more of the young people accepted demagogic recommendations for municipal ownership than did the older people. And that's natural. They are more impressionable.

Get this thought. If the Power Companies had been directing their story to the youth of the Nation, like commercial concerns do, for instance, 10 years ago to 15 year old kids, then today, 10 years later, there would be over 2½ million 25-year old persons who would be familiar with it; over 2½ million 24-year old persons would be familiar with it; over 2½ million 23-year old persons would be familiar with it; over 2½ million 22-year old persons would be familiar with it; over 2½ million 21-year old persons would be familiar with it.

That's a total of 12½ million voters from 21 to 25 inclusive. Vital, vocal voters.

The Youth of America is moving fast. An extra quarter or half million girls got married last year. An extra quarter million babies were born in this country last year. In the few minutes it takes to read this paper, over 160 babies were born in the United States.

Think, after the war, all these young mothers and fathers are going to be taking a major part in the life of this country, becoming voters and passing on the fitness of your Company to handle their electrical requirements. They should be kept informed. They should be won over to business management.

Ask yourself this question Power Company men:

"Are the high school boys and girls interested in me or my company?"

Well, I understand the REA is going into the schools today to find out if the children are being taught the uses of electricity on the farm, so that after the war these kids will be wised up on farm electrification and its uses.

Others Are Talking to America's Youth While Business Men Are Talking to Each Other!!

Did you read what happened in New York recently? Thousands of "Jitterbugs," "Hepcats" busted plate glass windows and doors to get into the Paramount Theatre to hear Harry James blow his trumpet. At 4 o'clock in the morning they were lined up for blocks. They sat in there all day to hear him several times.

Can you imagine that group reading your ads or factual statements? But, don't say "I don't care to have that group with me." Because you will several years from now, when they will be married voters. They're Americans.

The electrical industry has done a marvelous job as industries go. But it has not sold that job to the people. It has not told the story. Good deeds must be told about. They must be described in simple language.

Don't apologize for being simple. The Bible was simple. Christ was simple. Shakespeare was simple. Lincoln was simple.

Today's fast moving panorama calls for simplicity. It is an age of slogans and isms, escape mechanism. People like sugar-coated pills.

Sing something simple. Say it with flowers. Music is played in factories, but that's not new. The Volga Boat Song was made for that. Southern darkies sing while they work.

But we in the electric industry try to stay factual and try to tell too much about a technical and complicated business. We must learn to keep it simple and stick to the one or two outstanding values.

Philip Morris sloganizes "Call for Philip Morris." Old Dutch chases dirt. The Coca-Cola Bottling Company lifted an ordinary word "Refreshment" out of the dictionary and made it stand for Coca-Cola. Refresh yourself. It's refreshing.

Look at the great national story told by Elsie the Cow. So symbolized has she become that recently when *Time Magazine* wrote up the story of an eminent scientist, Dr. Soper, in St. Louis who began questioning whether adults should drink milk, the magazine could not help borrowing a picture of Elsie the Cow to adorn the article, and then to make the comment: "Millions of milk-drinking U. S. citizens have accepted Elsie the Cow as a heroine and are not likely to be deterred by Dr. Soper's theory."

(*In speaking of these characters, any resemblance or similarity to Reddy Kilowatt, your electrical servant, is merely a coincidence!*)

Slogans are effective. Emotions elect people. Slogans have featured political campaigns from time immemorial. Tippecanoe and Tyler too. 16 to 1. Free Silver. The New Deal.

"Do you want the benefits of Low Cost TVA electricity?" tells a story people believe!

Take the recent case of Edward J. Flynn, nominated as Minister to Australia. What blocked him. The people. How? By the simple phrase, "Paving Blocks."

People don't care how long you have been in business, or how big you are, but—"What will it do for me, and how much will it cost?"

We've got to address ourselves to the Wanting Mind, not the Thinking Mind.

Take the story of the pregnant woman who sold her mattress to buy a permanent wave! People don't buy on facts; they buy on emotions.

After this war, the people won't take your wares from you. You've got to sell them. It took Salesmanship to reach the great records, and it will take it again, plus Showmanship in today's challenging and competitive markets.

Charlie Michel said: "The same talents which developed this industry through sales promotion are now devoting themselves to the war effort. The talents that could accomplish what they did through the long periods of electrical development in home, office, store, factory and farm, surely can lift this industry to greater heights. Walt Disney took fairy tales out of old books and made them live and breathe in today's language, romance, love, life. The electric industry is a fairy tale of many hues. In the eyes of some it is probably as old as a fairy tale."

Can't we take this fairy tale of development and dramatize it for today's people?

Snowflake today . . . Kilowatt Tomorrow
Raindrop today . . . . Kilowatt Tomorrow

I like Owen Young's thought *"To gather up the tears of Mother Nature and make them smile in service to mankind."*

I entered the electric industry in its heyday. I entered it because I was captivated by its possibilities, its romance, its success, its human-interest values to the people; because of its high-minded and high-spirited leaders. I stayed with this business because I believed in it.

I cannot accept the feeling that this industry has lost those things. Rather do I look upon today's problems of change as an electrical metamorphosis, a period of renaissance, and your problems are but the pangs of rebirth that will give us a new and better industry.

"There is a tide in the affairs of men, which, taken at the flood, leads on to Fortune." The performance of the electric industry in this war is an outstanding achievement. Let's take that tide and swim with it. Good public relations are made on successful achievement, not on the defensive.

San Diego Company Cited for Wartime Service

REPORTED as the first award of its kind on the Pacific Coast, the Eleventh Naval District has officially recognized the contribution of the San Diego Gas and Electric Company to the war effort in this area with the presentation of a citation for "meritorious wartime service."

A certificate bearing the citation signed by Rear Admiral D. W. Bagley, USN, Commandant of the Eleventh Naval District, was presented to Hance H. Cleland, company president, by Capt. A. K. Fogg, (CEC), USN, Eleventh Naval District Public Works Officer, on behalf of Admiral Bagley.

More than 500 cheering employees of the company witnessed the ceremonies in the utility's service yards at 11th and Imperial Avenues.

Prefacing his remarks with the observation that the Navy has never been lavish in its praise, Capt. Fogg declared the company's outstanding record had earned the Navy's highest compliment—"well done."

"I wish to call attention," he said, "to the handicaps which this public service company has cheerfully over-ridden in its highly successful efforts to operate at an absolute maximum of efficiency for the greatest possible benefit to our armed forces and our production front here at home.

"The same shortages of manpower, of material, of transportation, of tools and equipments that face the rest of the nation's business, have faced this company.

"And this company has met every challenge squarely, has licked its problems, and has delivered the goods—without ever a question as to the possibility of performing a given task with maximum speed and efficiency."

Application Engineering— A Key to Farm Production!

By George W. Kable
Editor, Electricity on the Farm

PUTTING electricity to work on the farm presents a number of problems which differ materially from those involved in the design of equipment for industry or appliances for the urban home. Since these problems are fundamental to the design of farm electrical equipment I will discuss a few of them before taking up specific applications.

Differences in Requirements of Farm and Urban Equipment

Practically all farm service is single phase service. Because of the relatively great distances between farms, individual transformers are usually necessary and the cost to serve, and often the service charge or rate, is high if the demand is high. In the design of equipment it is obviously desirable to keep the demand low and the load factor and diversity high.

The annual use periods of much farm equipment is notoriously low. A combine, for instance, or a hay hoist or silo filler may be used for only five or ten days in a year, and a hay drier possibly a maximum of sixty days. Generally the investment cost per day of use is high. This must be reckoned with in design. Furthermore, an irrigation pump in California where it may be used quite continuously for seven months in the year should be an efficient piece of equipment. In New Jersey, where it may be used for seven days in the year, efficiency is relatively unimportant in comparison with first cost.

Ruggedness and reliability of operation is important in such equipment as water systems, incubators, brooders, milkers, laying house lights. The farmer has no plant engineer to call on when something goes wrong. He is also dealing with life processes which cannot wait on repairmen. If the brooder element burns out the chicks chill and die or pile up and smother. If the milker stops, the cows must be milked by hand—now. If the hen house lights fail, the birds may go into a moult and be off production for the season. If the freezer compressor stops, his year's food supply is spoiled. The farmer is no expert electrician or mechanic, but his equipment to be satisfactory must be such that he can care for it and keep it running.

Farmers are accustomed to large power units. They grind a week's feed with the tractor in three hours; they jam the year's ensilage through the cutter in two days. Either large power units must be provided or small ones must be semi-automatic and have other advantages to offset bigness.

The farmer's cash income is less than that of the city man as a rule. But he spends for fewer things than the commuter. He probably gives more thought to what he does buy.

A Challenging Field

This may sound like a difficult and unattractive field. It is difficult but not impossible and not unattractive. The steadiness of the farm load during periods when industry was in the doldrums was a bright spot for many utilities. The total purchasing power of farmers is enormous. Our agriculture and farm life should be made the pride of the Nation.

In spite of the greatly increased number of farms with central station service and the gradual build-up of kilowatt-hour consumption per farm, the field for the productive use of electricity in agriculture is still before us, and is poorly cultivated.

In a survey reported last year of one of Oregon's most prosperous and early electrified agricultural counties two interesting facts are pointed out. With an average annual farm consumption of 1504 kwhr and a high saturation of *home* appliances, the only *farm* appliances with a saturation above 7 per cent were brooders with 15 per cent and electric fences with 29 per cent. The other fact was that the high average consumption was due largely to a few top farms. Five per cent of the farms averaged 9886 kwhr while the 95 per cent averaged only 1062 kwhr. There is the uncultivated field. And this county is in a rich dairy, poultry, truck and fruit section of the Willamette valley.

I shall make no attempt to cover the whole range of electrical equipment now used on farms or to paint a rosy picture for you. In giving you a "taste" of electric farm equipment I hope to say something which will stimulate a little additional action toward making electricity a more potent factor in farm production and farming an industry of which more farmers can be proud.

Features of Some Farm Equipment in Use

A farmer's equipment constitutes his *machine tools of food production.* One of the most important of these in wartime is the milking machine. It enables one boy, or a girl, to milk twenty cows in the same time that it took two or three persons to milk them by hand. That milking job must be done twice a day, every day in the year—Sundays and July Fourth included. The hand milkers are no longer on the farms. If the milking machine or its motor breaks down, part of the herd would in many cases have to be sold, and disposed of quickly. It behooves the industry to see that they do not break down. Some utilities have built up a bank of small motors for quick replacements. Having motors repaired is a slow job now for farmers.

Milking machines have been used for many years. Some were overused and injured the cows udders. Two years ago, the New York Agricultural Experiment Station published a report giving results of tests showing that most cows can be milked by machine more efficiently, more completely and with fewer ill effects, if the machine is left on the cow only four or five minutes. Cows quickly learn the fast milking and require practically no stripping. A *farmer* has invented a milker timer that hangs about the milker's neck and rings a bell when the time is up. It is a small thing, but it tops off the success of the machine milking.

Hot water is essential in the dairy. A simple electric water heater has become popular. You pour in a quart or a bucket of cold water and out comes a quart or a bucket of hot water. It is always hot. The unit is cheaper to buy and to install than a plumbed-in heater.

Thousands of milk coolers are in use all through the country. It costs perhaps one-fifth as much for electricity as

for ice to do the same cooling job, and electricity does it better and with much less labor. The point I wish to make about milk coolers, and which should apply also to the design of other equipment, is that they are now shipped ready to plug in. Even a refrigeration machine for use in the farmer's own tank is made to be dropped into the tank and plugged in without the services of a refrigeration man to pump out the coils and charge them with refrigerant. Service and installation calls in the country are deterrents to the use of electrical equipment.

Electric chick brooders are of many designs. Each year brings new ones. All of them will brood chicks successfully. Based on the statements of farmers and the record of sales, electric brooders raise better chicks with less labor and less anxiety than fuel burning types. Some poultrymen insist on brooders with ventilating fans. They are now widely used. The first one was built out of tin cans and a Polar Cub fan by an Oregon farmer who lived in a rainy climate.

Within the past two years a homemade radiant heat type brooder designed at the Ohio State Experiment Station has become popular. It is heated with two R-40 250 watt heat lamps. The brooder looked dubious with its uneven heat distribution, high light intensity and lack of a heat control. From reports received, the chicks like it. Chicks instinctively hunt out their own comfort zone if it is available. If the brooder is not overcrowded, they can find the right zone. Eighteen years ago, I learned of a farmer in Texas who was brooding chicks in a lamp heated brooder he had built.

One of the least expensive and most easily built pieces of equipment for the results it gets is the pig brooder. It consists of a radiant heater, usually a lamp placed in the corner of the farrowing pen so the new born pigs have access to the warmth, and where they are protected so the sow cannot lie on them. In studies at the Purdue Experiment Station it was found that these pig brooders saved 1½ pigs per litter and there was 30.5 per cent more pork at weaning time.

Lambs also are brought through the first few days of babyhood with lowered mortality by the use of brooders. The little fellows are usually born during periods of bad weather, but they are dried, warmed and perked-up by the radiant energy.

Brooders are justly popular because they are simple, easily cared for, and they save stock and make money for the farmer.

The electric fence is another piece of equipment invented by a farmer. It was not encouraged or even sanctioned by many power companies, but in spite of that has become one of the most used pieces of electrical equipment on farms. Maintaining farm fences is a big job. Livestock learns to go through them. But the stock soon learns to *avoid* the electrified wire. It holds hard-to-hold animals. It is quick and easy to erect so that parts of fields, ditchbanks and temporary pastures may be fenced-in to save waste of grain or grass and to control weeds. That means dollars in the farmer's pocket, so while the manufacturers, regulating bodies and scientists have continued to argue about what is a safe fence, the farmer has taken his own risks and used them. He has even used 115-volt current directly on the fence wire, sometimes with disastrous results. We do not need more designs of electric fences but we do need unanimity of opinion of the experts so the farmer will not be confused.

Farm Crops and Methods Changing

There are constant changes of crops and methods on farms calling for new and different equipment. Preliminary processing of chemurgic crops offers an entirely new field. Some other changes which have been taking place include the field chopping of ensilage, the pick-up baler or field hay chopper and supplemental irrigation in humid regions.

Field chopping of ensilage means that the stationary equipment for ensiling crops will change. Instead of the ensilage cutter which taxed a 5 or 7½ horsepower motor with corn, and required a 7½ or 10 with the new grass silage, the elevating of chopped feed into the silo may now be done with a 3 horsepower bucket elevator, or with a simple blower. Chopped hay is easier to handle and feed and there is less waste. It is blown into the mow instead of being hoisted.

Each year irrigation gains a little in the humid areas. The reason is that there is almost never a season without some dry periods when crops suffer. The need is mostly in gardens and for small fruit and truck, but the time may come when it will be profitable to irrigate pastures and other crops. It will be that little extra growth or succulence or nutriment which will make the difference between breaking even or making money. There are many little niceties of production of this kind on the farm where electricity fits ideally.

Home built farm elevators operated by one-quarter to one horsepower motors have taken on new interest during the war. The latest one is a quarter horsepower drag elevator for grain in which the drag blocks or flights are stapled to a common half inch rope with fence staples. It has a capacity up to 300 bushels per hour. It saves extra men and a lot of hard work, and the little portable motor is available for many other similar jobs.

One of the most promising pieces of major farm equipment involving electricity is the mow hay finisher. It takes hay that has been partially cured by several hours exposure to the sun, and puts the finishing touches on it. By handling the hay before it is completely cured, the most valuable part of it, namely, the leaves and the green color, are preserved and the leaching due to rains and dew is prevented. There is no extra handling of the hay. It is placed directly in the mow over ducts through which air is blown periodically until a proper moisture content is reached. The air keeps the hay temperature down and removes the moisture. These finishers are now spotted all over the United States. In nineteen installations in Virginia last year 89.6 per cent of the mow cured hay graded U. S. No. 1 or No. 2 while only 21.5 per cent of the hay cured in the field at the same time graded No. 2 or better. Farmers can build their own duct system and recent tests indicate that they may even build their own blowers of plywood. Motors of 5 and 7½ horsepower are used. A low cost hay drier was one of the impossible jobs of ten years ago.

Ultra-voilet irradiation for poultry had a boost last year in the results of investigations published by the University of Nebraska in Experiment Station Bulletin 344. Fish oil cost about 5c per hen for the 121 days of the test. With electricity at 3c per kilowatt-hour the cost of using S-1 lamps was about 3c per hen with lamp replacements costing another 3c. With S-4 lamps the electricity cost was 0.87c and lamp replacements 2c per hen. In addition to saving 2c per hen over the cost of oil, the number of eggs laid by the irradiated pullets was slightly more, the mortality was less and the hatchability of the eggs laid was higher. In the past, results with ultraviolet lamps have not always been profit-

able. They call for intelligent use and good voltage regulation.

I have mentioned hot water in the dairy. Where market milk is sold, some states or milk sheds require steam sterilization of milk utensils. Some clever electric sterilizers have been on the market. I want to call attention to just one because of the electrical design problems involved and because there is still a big field for it. It is the offpeak steam accumulator. This equipment originated in the Northwest. Some years later California discovered it and became enthusiastic. A few are in use in Western Maryland. It is not made or sold in the East.

The steam accumulator is a glorified electric water heater of 30 to 75 gallons capacity, well insulated and provided with water glass, blow-off valve, pressure gage, thermal or pressure control switch and piping for filling and for drawing steam from the top of the tank and superheated water from below the water line. The heating element near the bottom of the tank must be of such wattage that the desired water temperature will be reached in the recovery period available. The cycle of operation is to fill the tank nearly full immediately after one has finished using the water and steam. Steam and water valves are then closed and the current turned on immediately or by time switch. Steam and hot water are used in most farm dairies either once or twice a day. The tank capacity, temperature setting and wattage having been selected to suit that farm's needs, the accumulator will be full of superheated water by the time of the next use period. The superheated water is drawn from the bottom of the tank and mixed with cold water for utensil washing. That lowers the tank temperature very little. The water flashes into steam when the top steam valve is opened.

Harold Merrell, a farmer near Wolcott, N. Y., needed steam in his apiary for his honey uncapping knife for keeping extracted honey in liquid condition for filtering and for cleaning equipment. The periodic use would not warrant the several hundred dollar cost of a tailored commercial electric boiler. He made his own. It has a 300-watt element and all the essential features of a safe boiler. It operates at 5 pounds pressure and does the job at an operating cost of about 25c per day. There are a number of places where a little steam could be used to advantage on many farms but where the use does not justify a $200 expenditure.

The home food dehydrator tops today's equipment list in general interest. It has attracted hungry designers from colleges, utilities and industry like a "steaks today" sign on a meat rationed butcher shop. I anticipate a little "tainted meat" and tough chewing.

Some of the small home dehydrators with heat controls, when used intelligently, will yield excellent products with flavor, color, nutrients and vitamins retained. It is not just a simple matter of drying. The pre-processing is more laborious than that for canning or freezing. The processing and the drying time and temperature varies for different foods. Overheating ruins quality, yet fast drying is desirable. Home dehydrators will help save foods which might be wasted during wartime. It should be recognized, however, that we might waste even more by hit and miss attempts at drying without adequate information and well designed equipment.

One of the design problems of small dehydrators is a low cost heat control. Without a heat control the air temperature in a dehydrator tends to be low at the start and high toward the end of the drying period. This is just the opposite of what is desirable. Moisture is removed fastest when the foods are first put in. The food will remain relatively cool even with high air temperatures because of the free evaporation of moisture. Toward the end when the food temperature approaches the air temperature, the quality will be injured if the temperature is high. I have suggested to several designers that the placing of the control in the product itself might automatically solve this difficulty by setting the control at the maximum safe product temperature.

Farm freezers and food storage cabinets, to my notion, offer great post-war possibilities. Generally speaking, people like frozen foods better than canned or dehydrated or even than some fresh foods. The preparation process is quite simple, the convenience of having the foods at home is a great advantage over the locker plant, and a still greater advantage is the ability to freeze small quantities of excess foods at any time—quantities that would be wasted if they had to be taken to the locker plant. Locker operators no longer object to home freezing cabinets. Some encourage them as a good combination.

In such a new field, there is still much discussion of what is a proper size of farm freezer. There is no proper size. Sizes range from 4 to 70 cubic feet, but I have heard of no one whose freezer was too large. Sixteen to 24 cubic foot have been the popular sizes although family food requirement experts lean toward 40 cubic feet.

Some cabinets have separate freezing and storage compartments. It seems now that single compartment cabinets with freezing shelves, plates containing a eutectic solution or frozen brine storage with possibly a fan for creating an air blast, will fulfill farm requirements. Some more convenient ways of getting the frozen foods out of the cabinets (most of them are top opening chests) is desirable.

The final answer to cabinet design has probably not been reached. The refrigeration machine must take care of heat leakage through the walls and openings, and remove the heat from the products to be frozen. Most cabinets have had about four-inch insulated walls. By increasing the insulation it would be quite simple to reduce the size of compressor needed to compensate for heat losses and to maintain foods in frozen condition. The big load on the compressor comes when a farmer puts in half a beef or a hog. Several years ago H. W. Sterling of the Eastern Shore Public Service Co. designed and demonstrated a freezing cabinet of 45 cubic feet storage capacity equipped with a one-quarter horsepower compressor. The cooling coils were made in the form of shelves. He took care of the peak freezing loads and possible power outages by placing tin cans of brine on the shelf coils and freezing them during off-peak operation.

A cabinet similar to this in size and with a one-quarter horsepower refrigeration unit was designed and tested by P. T. Montfort of Texas A & M College last year. This box was insulated with 9½ inches of fiberglass and was supplied with six galvanized iron tanks holding 325 pounds of 23 per cent sodium chloride brine. It had 35 cubic feet of storage space. Under test in an 82° constant temperature room this chest was cooled to −11° F. at its center without stored products and the electric power then cut off. With the doors of the box closed it took 5 days and 10 hours for the temperature in the box to rise to 32°.

The operating cost of such cabinets is low. Compressors of this size could be constructed at low cost under mass production. Still more important, however, is the quelling of sales resistance due to possible power outages and food spoilage. Another feature of this design is the placing of a vapor seal inside the

outer wall and using a wood lining with no vapor seal on the inside. It keeps the insulation dry. These features merit careful study.

Engineering Involved in Other Uses for Electricity on Farms

At the conclusion of the war many men who are experienced welders are going to return to farms from war plants. A welder is potentially the most valuable electrical tool a farmer can have on his place. At present it is perhaps the least desirable from the standpoint of the utility because of its high demand, low consumption and its bad effect on line voltage. The welder will save many trips to town for repairs and much waiting for repairs. Often it is quicker and cheaper to weld a part in place than to take the machine apart to replace it. It will also give the skillful farmer an opportunity to make equipment which he may devise for special jobs. That inventive ability close to the soil has possibilities worth cultivating. While not a pay load for the power company, welders will be a boon to the farmer and increase his interest in electrical equipment. Welders are coming on the farm and we had better get ready to make the best of them as we have with electric fences. There are possibilities in 30-ampere welders or in improved characteristics of the larger sizes.

Many small communities are obliged to use uninspected raw milk because there is no simple, inexpensive small milk pasteurizer. The prevalence of milkborn undulent fever is increasing. Work was started on the development of a five-gallon batch pasteurizer on the National Rural Electric Project ten years ago and has been continued by the University of Maryland. Milk resistance heating is employed using carbon plate electrodes. There is some difficulty in getting proper temperature controls at low cost, and still greater difficulty in getting the approval of health authorities, even though the need is genuine and is recognized.

Soil sterilization in greenhouses or for plant beds, or the annual replacement of these soils is a costly job by any method now used. Some means of sterilizing soil in place in greenhouse benches would be welcomed by growers. There are possibilities of series-parallel connection combinations for soil warming and soil sterilization if a reliable, high temperature, reasonably priced cable were available. Other types of electric soil sterilizers have been made. J. R. Tavernetti of the University of California built a continuous soil pasteurizer with a capacity of five cubic feet per hour. It consists of a six-foot length of four-inch iron pipe, electrically heated, through which the soil is forced by an auger. An improvement now being worked on by the General Electric Co. is the supplying of the heat through the shaft and blade of the auger.

Insect damage to crops in the United States is estimated to reach $2,000,000,000 annually. We have never made great progress in controlling these pests electrically although we do have some specific evidence that certain types of garden insects can be controlled by light traps. Gardens are usually close to homes—not far from electric service. If a dependable system could be worked out, what would speak more eloquently the benefit of electricity than a light trap in every farm garden.

In spite of many trials in widely separated places, electricity for field power has never become established. It is questionable whether large electric tractors for field use would be desirable now even if they were feasible. Small tractors for suburban, part-time farmers might be.

In conclusion may I repeat that farmers are a prolific source of ideas and accomplishment in the practical use of electricity. These ideas and uses need to be searched out and engineering assistance given in developing them.

Also, it is such little things as a good heat control on a dehydrator, control of the hay hoist from the load, a timer for the milker, the automatic water system, that gives electricity its big advantage on the farm.

We need a more open minded, less selfish approach to equipment design. The farmers' needs as regards cost, simplicity and function are most important. If the farmer does not profit sufficiently to be interested, no one will profit.

Rukeyser Praises Utilities' Effort in War

By M. S. Rukeyser in New York Journal-American

LIKE the nation's transportation system, the electric industry has proved a tower of strength since the United States entered the war.

The miraculous achievements of the newly improvised armament industries were closely related to the performance of the public utility from which mechanical energy flowed.

In spite of the great and unexpected peak load, especially in war production areas, the electrical industry has proved no bottleneck; on the contrary, nationally, it has done a remarkable overall job in providing light and power for war industries and military projects, as well as for regular industrial, commercial and residential users. Unlike other industries which have donned khaki, this industry has not ceased giving regular service to civilian customers.

In order to conserve fuel, transportation, and use of critical materials, a drive will start after the Summer for conservation in the use of all utility services.

Even curtailment, such as in the dim-out areas, has been done for reasons of national defense—and not because of a power shortage. Before Pearl Harbor there had been temporary shortages in the Tennessee Valley area due to low water conditions.

In the Pacific Northwest the lion of public power and the lamb of private power have been lying down peaceably together. The power pool makes the total available where most needed without regard to controversial political questions relating to ownership and management. Frank McLaughlin, president of the Puget Sound Power & Light Co. of Seattle, pioneered in advocating such coordination in the northwest and in demanding that political differences be pushed into the background at least until the war against the Axis has been successfully prosecuted.

Referring to the achievement, Ashton B. Collins, meistersinger of the power industry, recently said:

"Since Pearl Harbor there has not been a single instance of shortage of electricity in the whole United States—for any war production job for any user: home, farmer, office or factory. What an enviable record! Surrounded by shortages, electricity is the one essential commodity meeting any and all demands. You don't need a ration book for electricity. It can't be hoarded."

Men in the industry point out that, as further restrictions are made in September on the use of electricity for outdoor advertising and the like, it will be to save coal or transportation, but will not be caused by a shortage of generating or electric distribution facilities. The industry is eager to interpret the reasons for such conservation in the use of electricity as may become necessary.

Impulse Voltage and 60-Cycle Life Tests of 22-KV Cables and Cable Terminals

Various Types of Construction

By W. P. Cook
Duquesne Light Co.

A paper presented before the Transmission and Distribution Committee, EEI, Chicago, May 10, 1943

THIS paper deals with an operating problem presented by the performance of 22-kv cables and cable terminals on the Duquesne Light Company system. During the past decade, changes in the method of installation and in construction of the equipment have taken place, and it was the purpose of these tests to determine the relative merits of our present standard of construction as compared with previous methods.

The earlier type of construction used for terminal poles consisted chiefly of a 3/c, paper-insulated cable from the manhole to a 3-way multiple joint on the pole, and 1/c cable (rated at 35 kv) from there to the cable terminals (rated at 46 kv). The 1/c cable was 24/64 in. paper-insulated with a rather thick and tacky impregnating compound, and the cable terminals were made up using a polished brass casting stress cone attached to the cable sheath at the base of the terminal. The cable terminal was filled with an asphalt-base compound which was solid at normal operating temperature. This type of construction gave very little trouble. It should be noted here that the manufacturer of the cable terminals recommended that in installing the brass stress cone the space between the cone and the conductor should be filled with a varnished cambric tape. This was difficult to do as it involved first sliding the brass cone down over the conductor and the sheath, building up of a cone from v.c. tape, and then sliding the brass cone back over the tape and sweating it to the cable sheath. To get an effectual seal between the brass cone and the tape, and to attach the brass cone to the sheath without leaving rough edges internally, was practically impossible. For this reason the manufacturer's recommendation was not followed, and the complete assembly was later filled with an asphalt base compound which was semi-fluid at normal operating temperature. As mentioned above, this type of construction gave very little trouble.

Changes in manufacture of the cable used by the Duquesne Light Company indicated the use of an impregnating compound which had a greater tendency to migrate in vertical cable runs. In addition, during this same period, the Duquesne Light Company changed from 24/64 in. to 18/64 in. paper insulation in accordance with I.P.C.E.A. specifications for 22-kv cable. Terminal pole construction was changed to a 3-way multiple joint in the manhole with 1/c cables from the manhole to cable terminals, thus eliminating the difficulty of constructing a vertical joint on the side of the pole. During these changes in cable construction and installation, no change in the method of installing the cable terminals was made.

Cable terminal failures began to occur more frequently than they had on the 24/64 in. paper-insulated cables, and in most cases the trouble could be assigned to cable impregnating compound migration. Investigation of the failures revealed that the insulation on the conductor within the cable terminal was practically devoid of impregnating compound, while the cable just below the cable terminal was usually supersaturated.

To overcome the problem of loss of cable impregnating oils in the cable insulation, the filling compound was changed to a mineral oil compound similar to that used in impregnating the cable insulation. Thus, the cable terminal would act as a reservoir to replenish the cable-impregnating compound lost due to normal migration. The brass stress cone was still retained. Several failures soon occurred in this new construction, and in all cases the fault was located in the conductor near the base of the brass stress cone.

Investigation into the cause for failure at this point revealed that the weakness was due to the difference in specific inductive capacity of 3.7 for the impregnated paper insulation and 2.2 for the mineral oil. With this difference in S.I.C., the oil was over-stressed at this location, leading to failure of the paper insulation. To overcome this weakness, it was necessary to fill in the space between the impregnated paper insulation and the stress cone with a medium of higher S.I.C. than the mineral oil. The construction standard was then changed to eliminate the brass stress cone, and in place of it to install a solid cone built up of layers of black varnished cambric tape having a S.I.C. of approximately 5, and jacketing the cone with copper mesh braid.

Several different mineral oils are used by the Duquesne Light Company to fill the cable terminals. These oils all have comparable dielectric properties but vary in the physical properties. Rate of migration tests were conducted using these different oils in which one oil having a viscosity of 273.4 at 210 deg. F. was found to have a very slow rate, while another having a viscosity of 106.5 at 210 deg. F. had a much higher rate. Both of these mineral oils are being used by the Duquesne Light Company and have given satisfactory performance. Inspections of oil-filled cable terminals in the field which had been in service for over two years showed that only from 1/3 to 1/2 pint of oil was required to fill them to their correct level.

In changing over to the use of oil-filled cable terminals, several other problems present themselves. It was first thought that the migration of the oil might lead to rupture of the joint from internal pressure. A test was made which indicated that the joint would stand a pressure in excess of 30 lbs. per square inch, which corresponds to a static head of oil of about 75 feet. No such head is experienced on the Duquesne Light Company system. A further increase in pressure in the joint may

develop due to loadings and load cycles, and it is realized that it may be necessary to go to reservoirs and oil stop joints to overcome this possibility. This would not add materially to the maintenance costs on the line as this equipment would be inspected during the routine inspection and test which is conducted every 3 to 5 years, depending upon the load cycles experienced and local atmospheric conditions.

The following tests were conducted to test the relative strength of the taped cone oil-filled cable terminal as compared to the brass stress cone oil-filled cable terminal. Other objectives were to observe performance data for the cable used and to investigate the effect upon power factor and specific inductive capacity due to contamination of the joint-filling compound by oil migrating from the cable terminals.

Nine samples were prepared for testing, each consisting of a piece of 1/c, 18/64 in. paper-insulated cable with a cable terminal installed on either end. Six of these samples were made up with a brass stress cone type of cable terminal installed on one end and a taped cone type on the other end. Of these samples, four were used for impulse surge testing, and the other two were used for accelerated life tests. The remaining three samples were made up with a taped cone type of cable terminal installed on both ends, and all were used for impulse surge testing.

For the impulse tests, the equipment used consisted of a surge generator made up of twelve 60-kv capacitors which are charged in parallel and discharged in series. The surge voltage across the sample can be varied by changing the charging voltage and by changing the number of capacitors in the circuit. A cathode ray oscillograph is connected through a potentiometer circuit to enable the operator to observe the wave form of the discharge, and a film is used to produce a permanent record. From the constants in the circuit the generator is calibrated in kv per cm. deflection on the film, and thus the breakdown voltage of the sample is obtained. The generator was first adjusted to give the standard 1½ x 40 wave form, that is, 1½ microseconds to reach its peak value and 40 microseconds to fall to ½ of the peak value. Samples were tested by connecting the terminal lugs of both cable terminals to one electrode of the generator and connecting the other electrode of the generator to the cable sheath and ground. The voltage was increased in steps of approximately 30 kv until a breakdown occurred. The complete series of surges on the one sample is shown in Fig. 1. The higher line on the print is made on the No. 1 tap of the oscillograph and the voltage is obtained by multiplying the height of the peak in cms. by the circuit constants, in this case 78.5 kv/cm. A second impulse at each voltage was applied on the sample using the ¾ tap of the oscillograph to insure having a record of the breakdown. This is the lower line on the print, Fig. 1, and the voltage is obtained from it by multiplying the height of the peak in cm. by the circuit constants and dividing by ¾. Applying so many surges to the sample (in this case 15 separate surges) no doubt lowered the ultimate breakdown strength of the sample.

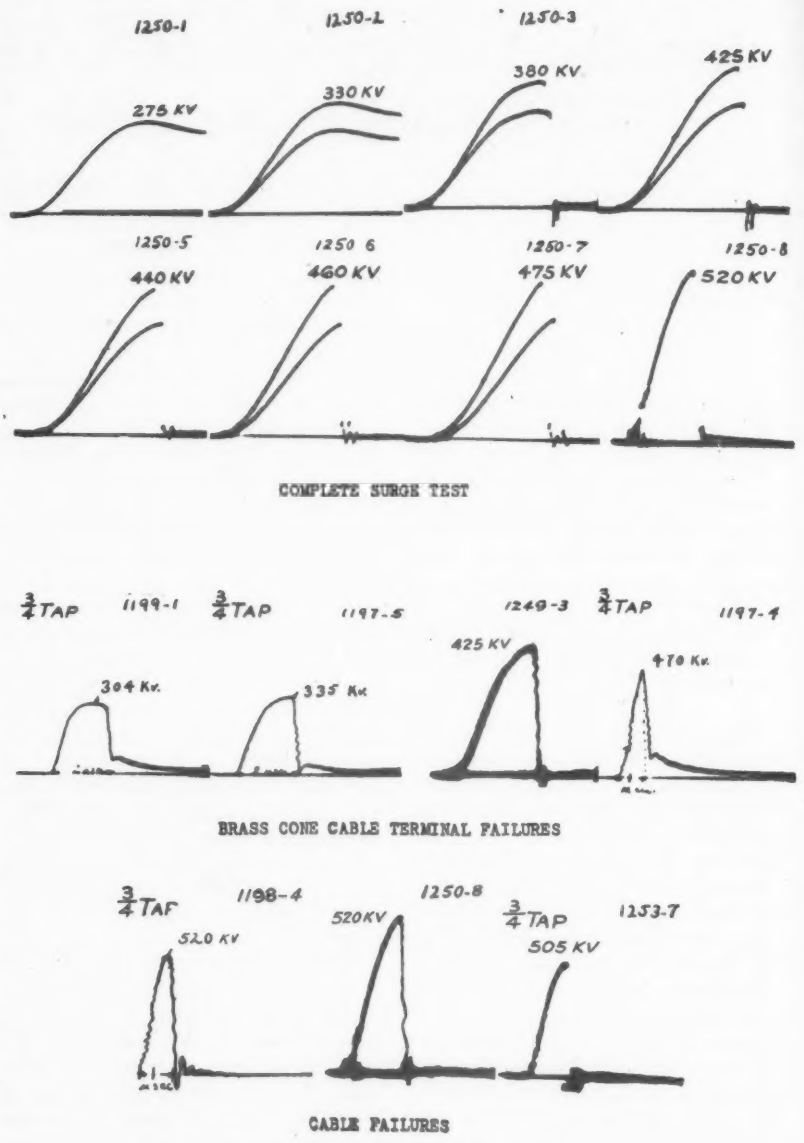

Fig. 1—Cable Terminal Surge Tests

In testing the four samples having a taped cone cable terminal on one end and a brass cone cable terminal on the other end, the same procedure was followed. In every case the failure occurred in the brass stress cone cable terminal and at the following values: 304 kv, 335 kv, 425 kv, and 470 kv, for an average value of 384 kv. The failure paths were similar in each case, namely from the conductor at a point near the top of the brass stress cone, through and along the paper insulation and mineral oil to a point near the center of the brass stress cone. The breakdown voltages were obtained from the prints, Fig. 1.

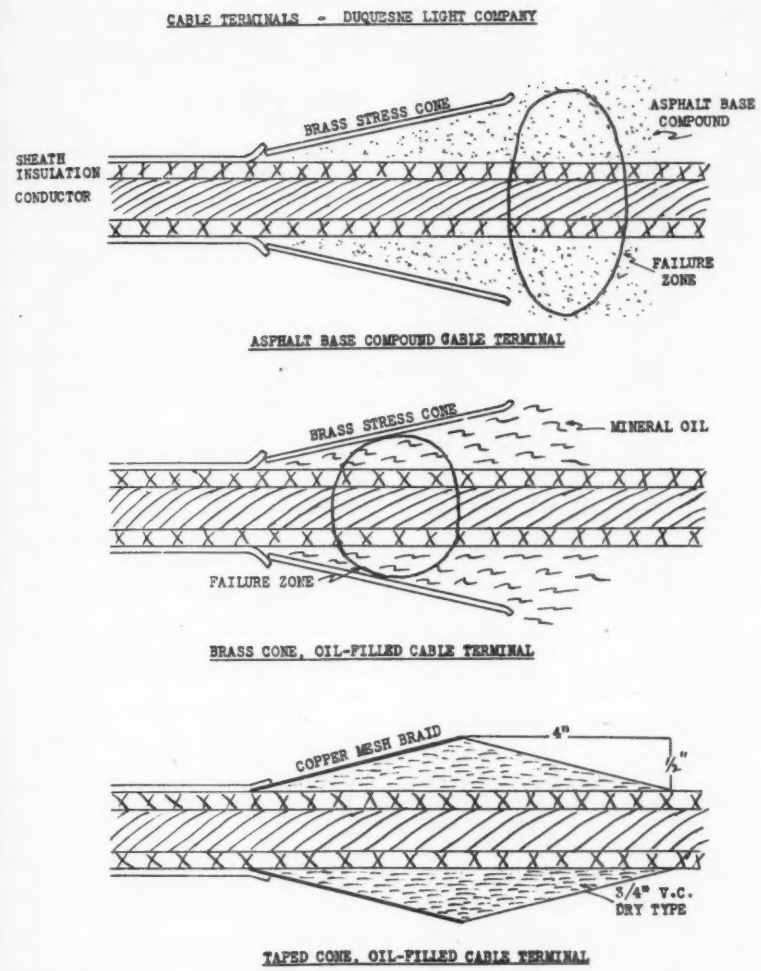

Fig. 2—Cable Terminals

In testing the three samples having a taped cone cable terminal on each end, the same procedure was followed. The results were similar in each case, the failure occurring in the cable between the two cable terminals. The breakdown voltages in these tests were 520 kv, 520 kv, and 505 kv (average 515 kv), and are obtained from the lower prints in Fig. 1. Two of the cables used in this test were new cables (one 1942, the other 1943), having a conducting shield next to the conductor. The third cable used was a 1940 cable having no shield around the conductor.

For accelerated life tests, two samples were prepared. The first was made up using the taped stress cone and cable which had withstood the surge test of 335 kv, with a new brass cone on the opposite end. The second sample was made up using new cable with a new brass cone on one end and a new taped cone on the other. Both samples were energized with 60-cycle, 50-kv voltage, four times the normal phase-to-ground voltage until a breakdown occurred. The first sample failed after 84 hours in an internal flashover from the terminal lug to the taped stress cone, probably due to weakening by previous surge tests. The second sample failed in the cable after 600 hours. The life expectancy of the cable under this condition was 400 hours.

Impulse tests on 1/c, 18/64 in. paper-insulated cables produced failures at a value of 155 kv after removing the impregnating compound by heating the cable in an oven. This condition would simulate the condition due to compound migration found in service of the asphalt-base compound-filled cable terminals which had been in service for a number of years. The lightning arresters used in this type of installation have a nominal rating of 175 kv, which value is obtained only under perfect grounding conditions, and so in an actual field installation the value may be somewhat higher. Thus, an asphalt-base compound-filled cable terminal which had been in service for some time could fail under the surges experienced in a lightning storm. A number of cable terminals using this type of construction were removed from service and tested on the surge generator. In every case, the cable terminal failed from the conductor to the top of the brass stress cone at an average value of 210 kv. These test failures were similar to the service failures on the system.

Four failures occurred in the cable during all these tests. Three of these were on the surge tests in which a taped cone cable terminal was installed on each end of the cable. The first sample was built up using 1940 cable and was 250 MCM, concentric stranded, 18/64 in. paper-insulated with no conducting shield around the conductor, and failed at a value of 520 kv. The second failure was in 1943 cable, 350 MCM, concentric stranded, 18/64 in. paper-insulated with a conducting shield around the conductor, and also failed at a value of 520 kv. The third sample was 1942 cable, 350 MCM concentric stranded, 18/64 in. paper-insulated, with a conducting shield around the conductor and failed at a value of 505 kv. These tests indicate that the insulation value of the taped cone type of cable terminal is above that of the cable. A fourth failure occurred in the cable of the 60-cycle accelerated life test sample in which a brass stress cone type cable terminal was installed on one end and a taped stress cone cable terminal on the other. The cable used was 1940, 350 MCM, compack stranded, 18/64 in. paper-insulated having no conducting shield around the conductor. This cable failed after 600 hours, using a 60-cycle voltage of 50 kv, four times the normal phase-to-ground voltage. This test indicates that for normal operation the insulation level of both the brass stress cone and the taped cone is above that of the cable.

In Fig. 2 are sketches of the various types of construction showing the location of the failure zones for the asphalt-base filled cable terminal and the brass stress cone oil-filled types of cable terminal. Also shown is a sketch of the construction of a taped stress cone type of cable terminal.

In a field installation using either type of oil-filled cable terminal, contamination of the joint filling compound by the oil occurs due to migration of the oil from the cable terminals. This action is very slow under field conditions, but it was thought advisable to investigate the effect upon power factor and specific

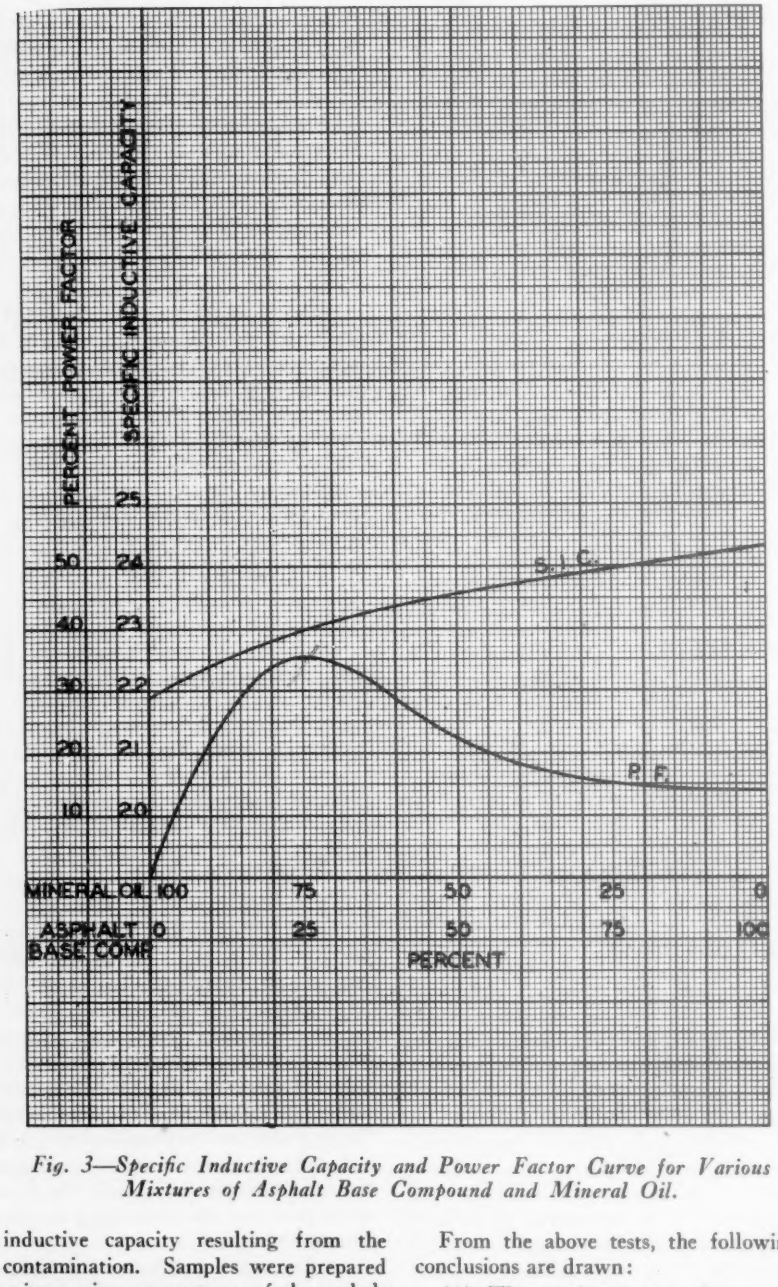

Fig. 3—Specific Inductive Capacity and Power Factor Curve for Various Mixtures of Asphalt Base Compound and Mineral Oil.

inductive capacity resulting from the contamination. Samples were prepared using various percentages of the asphalt base compound used for filling joints and the mineral oils used for filling cable terminals, and these tested with a capacitance test bridge. The results are shown in Fig. 3 and conform with the results obtained from similar tests on various other cable and terminal compounds, namely, that the power factor of a mixture of any two dielectrics is higher than the power factor of either dielectric alone. Also, the specific inductive capacity for all practical purposes varies directly as the proportion of the two dielectrics.

From the above tests, the following conclusions are drawn:

(1) The taped cone type of construction is superior to the rigid cast brass cone type.

(2) The life tests show that either type of construction is satisfactory provided no surges are imposed on the line.

(3) Where taped cones are used exclusively, the insulation level (both 60-~ and impulse) of the cable terminal is raised above that of the cable.

(4) The insulation level of the cable is well above the protection level of the lightning arresters used on this service.

(5) No particular hazard is introduced in the line due to contamination of the joint filling compound by oil from the cable terminals.

From these laboratory tests and from field experience it is evident that any contemplated change in design of terminal pole construction should be preceded by an extensive investigation of all the electrical and mechanical properties of the equipment and materials.

At the time of preparation of this paper, there were in service 110 sets of 3-1/c oil filled taped stress cone type cable terminals on the Duquesne Light Company system. All of the installations where the brass stress cone type of construction was used have been converted to the new standard. The present company policy is to make all new construction of the taped cone oil-filled type and to convert the present asphalt-base filled cable terminal to it when possible. To date, no failures have occurred in the taped stress cone, either in service or on any test.

Utility Credited for Initiating Successful Season in Resort Area

THE Central Hudson Gas & Electric Corporation, which for the past two or three years has been promoting the Catskill Mountains as a vacationland, has been acclaimed by the Saugerties, N. Y., *Daily Post* for initiating and cooperating in a publicity campaign which has resulted in making this season the most profitable one in a number of years in the Catskill resort area.

A recent article in the *Post* said, in part:

"All this time Ulster county might just as well have been dead and buried —for it was known only to these people who year after year came here because they knew about it. Its beauties, its natural scenery, its restful atmosphere, its commodious hotels, boarding houses, bungalows, its hospitality, etc., however were unknown to the thousands upon thousands of people who every summer seek a place where they can really enjoy themselves to the fullest in the brief one or two weeks' respite they are given from the din, turmoil and drudgery of everyday life. But suddenly there came the dawn of a new era. The Central Hudson Gas & Electric Corp. through its publicity department, working on the idea that Ulster county was in a somnolent state and needed a shot-in-the-arm, began on its own 'hook' to publicize the area, and favorable results began to show." . . .

Institute Executives Ask for Adequate Time to Review NARUC Depreciation Committee Report

THE following letter from H. L. Gruehn, Chairman, EEI Depreciation Committee to Hon. Nelson Lee Smith, Chairman, Committee on Depreciation, NARUC and the letter from C. W. Kellogg, President, Edison Electric Institute, to Hon. Frank W. Watson, President NARUC are reproduced for the information of readers of the BULLETIN. The letters deal with a matter of vital concern to the utilities, a report of the NARUC Depreciation Committee which, if adopted by the Association in its present form, would present a serious threat to the stability and efficiency of the industry.

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EDISON ELECTRIC INSTITUTE
420 Lexington Avenue
New York, N. Y.

August 7, 1943.

Honorable NELSON LEE SMITH,
Chairman, Committe on Depreciation,
National Association of Railroad and Utilities Commissioners,
7411 New Post Office Building,
Washington, D. C.

Dear Chairman SMITH:

This will acknowledge and thank you for the draft copies of your Committee report, which were sent to our committee members pursuant to your letter of July 15, 1943. As you realize, these copies were delayed in reaching us until August 2nd and 3rd, which under your time schedule leaves us the exceedingly short period of 6-8 days for review and comment.

As you know, the members of the American Gas Association and Edison Electric Institute Depreciation Committees have been assured that their accountants and engineers would have a reasonable opportunity, not merely to submit factual data to your Committee, as we have done from time to time, but to discuss with it freely and frankly the conclusions to be drawn from such data and the principles which should govern the treatment of depreciation in utility matters.

The expected opportunity to discuss your tentative conclusions has not yet been granted us, and the six to eight days available are obviously insufficient for a proper review of your report, much less for the discussions which we hoped might lead to substantial agreement with your Committee.

From the review we have been able to make of the Summary of the report, we believe that many of the premises and conclusions are in error, and we urge they be not adopted summarily. As only one example, we cite from Paragraph 39 of the Summary:

"A properly computed depreciation reserve is the best measure of accrued or existing depreciation . . . ."

and from Paragraph 40:

"In fixing public utility rates regulatory commissions should allow adequate depreciation expense according to the service life principle and should deduct from the gross rate base the reserve requirement, or its equivalent, computed according to the same principle . . . ."

and from Paragraph 41:

"The use of the straight line method in determining both depreciation expense and accrued depreciation is generally recommended for rate making purposes."

These paragraphs mean that for rate-making purposes there should be deducted from gross rate base a depreciation reserve (*a bookkeeping account*) computed retroactively, on a straight-line basis.

In our belief, the acceptance of these conclusions would (among other aspects) overlook the problems of good faith involved in the continuing relations between utilities and their regulatory bodies. For many years rates for service and the issuance of securities, under commission regulation, were based upon different concepts and different depreciation expense allowances than the foregoing conclusions now propose. To the extent that balance sheet adjustments, or rate base adjustments, now require an overturning of past actions taken in good faith, such retroactive determinations are inequitable. They would injure investors who have furnished capital in good faith; they would also make it appear that for many years commissions directed or allowed grossly inadequate depreciation (or retirement) charges under the principles, standards, and facts held proper—or else that they permitted excessive rates or returns. We do not believe the commissions so intended, nor that the proposed conclusion is reasonable.

We believe it would be unfortunate if the thorough study of the problem which your Committee began some years ago should not achieve its objective of producing a fair solution. We urge that all of the vital points at issue including those mentioned above, be given the full consideration of all interested parties. To do otherwise will not produce a sound solution of a long-standing problem toward which all parties concerned can bend their efforts.

On a matter of such vital importance to the industry, we feel justified in asking that formal approval of your Committee report by your Association should be deferred until a reasonable opportunity has been given for a full study and discussion of the report by the industry associations, by others interested, and by the regulatory commissions to whom its recommendations are addressed.

After we have had reasonable time to review the report with the care it deserves, we would welcome the opportunity, as previously expressed, to discuss your findings in the hope of reaching a solution on which commission and industry representatives can generally agree.

Yours very truly,
H. L. GRUEHN, Chairman,
EEI Depreciation Committee.

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EDISON ELECTRIC INSTITUTE
420 Lexington Avenue
New York 17, N. Y.

August 9, 1943.

Honorable FRANK W. MATSON, President,
National Association of Railroad and Utilities Commissioners,
7411-15 New Post Office Building,
Washington, D. C.

Dear Mr. MATSON:

Last week, the Chairman of the Depreciation Committee of the National Association of Railroad and Utilities Commissioners sent to the members of the Depreciation Committee of this Institute copies of its draft of the depreciation report to be submitted at the annual conference of your Association next month. I am attaching a copy of the reply from the chairman of our committee, pointing out the lack of opportunity for consideration of a report which treats of a subject of such importance.

Because we feel that many of the conclusions reached in the draft of the report are unwarranted and unsound and that they present a serious threat to the

stability and efficiency of our industry, now heavily laboring under war responsibilities, I am taking the liberty of submitting for your consideration and that of the responsible regulatory authorities a few comments on the tentative report. For reasons given below our comments on the report must be general in their nature, but we believe they relate nevertheless to fundamentals of the industry in its everyday operations.

We will carefully study the report which your committee has prepared and we urge that your Association take no summary action on the report, but that time be allowed for joint consideration and study by the accounting and engineering experts of both your committee and ours of the basic principles of this important subject which is a matter of mutual concern both to the industry and its regulators.

At the convention of your Association in 1938 and again in 1939, its Depreciation Committee submitted reports. The fact that in neither year was the Association prepared to take definite action serves to emphasize the complexities of this problem. You realize, of course, that during the past several years our industry committee has been studying the subject of depreciation and from time to time has furnished factual information to your committee. Late in 1942, our Depreciation Committee was advised by your Depreciation Committee that in conformity with action taken at your 1942 convention it expected to have available sometime in January, 1943, a preliminary report for submission to our committee. We were advised that we would have adequate time in which to analyze the report and that our designated engineering and accounting experts would have ample opportunity to sit down with the members of your committee to discuss the whole matter. This program was obviously delayed by war conditions, so that the draft of the report itself was not received by our committee until August 2nd and 3rd. At the same time, we were advised that the comments of our industry had to be submitted by August 10th, presumably to allow time to get the report published for your convention date only a month away. Furthermore, it was stipulated that the report was for confidential use, not to be reproduced for general distribution, so that we could not send it to, and invite the comments of, our member companies throughout the country. They in the final analysis, are the ones most directly affected. Under these circumstances, it was possible only to get together a portion of the personnel of our depreciation and of our accounting executive committees, limited mostly to those in this immediate area.

The report as drafted evidences a desire to force through a particular view of the subject. It does not develop and weigh all the aspects of the subject, and therefore does not commend itself to our industry committee as a sound treatise. It lacks the fair consideration of all factors affecting both consumers and investors that utility companies have become accustomed to, and have a right to expect from, their State commissions. We feel that an opportunity to render a constructive service has been missed and that the report has not advanced this important problem toward solution. We are convinced that to impose on this industry, as the report recommends, such radical departure from past regulatory policies, would seriously cripple, and to a considerable extent destroy, the ability of this industry to meet its obligations to the community and to consumers, and to continue the outstanding contribution to the Nation's social and economic development and advancement which has characterized its entire history. Such steps should not be hurriedly adopted merely to meet a deadline date.

The formula proposed for estimating depreciation would require building up reserves far in advance of the time they are needed, as those needs have been indicated in actual practice over the sixty-year life of the industry. This could serve no useful purpose, but, on the contrary, would place an unnecessary burden on the investors, the consumers or both. It should be pointed out that the present reserves have been accrued and accumulated under a standard classification of accounts promulgated by your Association and generally in effect over a considerable period of years.

Throughout its existence the record of this industry has been one of almost continuous growth and expansion, improvement of service and reduction in the price of that service. No industry has been more prompt to take advantage of new developments in equipment and methods, which have resulted from cooperative research carried on generally by the industry and equipment manufacturers. Obsolete and worn out equipment has been retired, while, at the same time, reserves to provide future requirements, for whatever cause, have been greatly increased, especially in recent years, and are now at the highest point in the industry's history. The same is true as to annual accruals to these reserves.

There is no evidence whatever to indicate that the overall reserves of the industry as now existing, primarily accumulated under the retirement reserve method required by State regulatory authorities, are not entirely adequate to the needs of the situation. If the proof of the pudding is in the eating, the evidence is strongly to the contrary. Few industries have been put to a more severe and practical test as to the adequacy of their facilities than has this industry during the war and the period immediately preceding it. The record shows that this test has been met completely.

This is one of the few industries that has had the facilities, equipment and organization to meet every war requirement superimposed on its peacetime business. There has been and is no shortage and no rationing of electricity, and it seems hardly conceivable that such a record could have been achieved by any industry whose past policies as to maintenance and retirement of its physical plant and property had been unsound or inadequate. Yet, as previously stated, reserves for these purposes have increased greatly throughout the life of the industry and are now at their maximum levels.

In the face of the facts we have presented, general as they necessarily are, we respectfully, but urgently, request that no precipitate action, based on theory, not practical experience, be taken with respect to this very important subject. We believe that the record of the industry entitles it to this consideration and warrants this request; especially in view of the unavoidable delay in the submission of the report to our committee of experts for study and the consequent lack of an adequate opportunity for joint analysis and consideration. May we also point out that the State commissions themselves have had no chance to study this report and to discuss its provisions with the utilities under their jurisdiction. The handling of depreciation is a mutual problem, one that has local application, and must deal with diverse local situations.

No emergency exists to our knowledge to require or justify summary action in this matter. The industry is functioning in an outstanding manner. It is meeting every service obligation in an extremely critical period. The immediate imposition of the radical departures proposed

in the tentative report could do nothing to improve that situation or contribute anything to the better functioning of the industry. On the contrary, such a course could have the opposite effect in this period of uncertainty and confusion when all of the energy of the industry's badly depleted personnel needs to be devoted to one purpose—the successful prosecution of the war.

We propose through our Depreciation Committee to undertake immediately a study and analysis of the report submitted by your committee, as was originally contemplated. We propose to push that work forward as fast as present exigencies and the magnitude of the undertaking will permit, to the end that further discussions, may be had with your committee with a view to developing a fair, sound and practical solution of this highly technical and difficult problem. Obviously, such a joint effort under present conditions would require months of work. Any solution, however, that is not basically sound and does not by its own merit command support of all the major elements concerned, is not really a solution.

We respectfully urge that until such a program can be worked out no formal action be taken in this matter. We shall greatly appreciate this considerate procedure on the part of your Association to the end that this basic industry, in cooperation with the regulatory authorities, may continue to function as an effective part of the country's enterprise system, as we believe the overwhelming majority of these regulatory authorities desire that it should do.

Very truly yours,
C. W. KELLOGG,
President.

Public Utility Valuation

Authorities Discuss Issues at Stake and the Consequences in Special Study Published by New York Journal of Commerce

THE abolition of the profit motive in the conduct of a large segment of American business would follow the adoption of the original or aboriginal cost basis and other radical theories of valuation of public utility property, in place of the long-established fair value doctrine, a number of economists, lawyers and other authorities conclude in a special study of "Public Utility Valuation—The Issues at Stake and the Consequences," recently published by The New York Journal of Commerce, 63 Park Row, New York, N. Y.

Dean Roscoe Pound of the Harvard Law School, in a leading article in this study, warns against acts of administrative agencies without check by the courts. "There is no valid objection," writes Dean Pound, "to rate making or to application of standards by administrative agencies. What lawyers object to is the proposition that these agencies alone of all the agencies of government, shall be without any substantial check, shall be free to ignore rights, to act in the teeth of evidence, or upon no real evidence, shall be free to keep the basis of their action concealed and cut off all opportunity for refuting or disputing it, and shall be at liberty to make rules of highly serious import with none of the checks which are imposed on legislative and judicial rule-making. The very features of human nature that make government and law necessary also make government and its agencies dangerous to the freedom they are set up to maintain and further. The English in the Middle Ages found how to have a strong central government along with local self-government; a strong administration tempered by strong courts and the doctrine of the supremacy of law. That is the policy we inherited and developed.

"Today there is a cult of force, a turning to absolute ideas of government, throughout the world.

"Partly this is due to the bigness to which everything has grown. The world has been coming to be unified economically. Air transport and radio have abolished distance, Instead of living in a neighborhood, or a city, or at most a State, we live in the whole world.

"Along with the bigness of things goes hurry. We are impatient to get things done. But doing things calls for efficiency, and the outstanding merit of autocracy is efficiency.

"The chief contributing cause of this turning to absolutism, however, is to be found in certain modes of thought characteristic of the times, which depart radically from those which governed in the framing of our legal constitutional policy. Chief among these are the Marxian economic interpretation of history and the doctrine of the disappearance of law, psychological realism, applying the Freudian idea of the wish to the science of law and to politics, and a relativism in politics largely influenced by the relativist physics of Einstein."

A strong plea for valuation policies that recognize value based on reproduction cost of facilities required to provide the service rendered is made by Professor Thomas Nixon Carver, Professor Emeritus of Political Economy of Harvard University, in his article.

"Under normal competitive conditions," writes Dr. Carver, "the valuation of a productive plant takes care of itself. First, the value of the plant depends on its earning capacity, and its earning capacity does *not* depend on its value. Second, if its earnings, actual and prospective, are so high as to give the plant a value much above the cost of reproducing it, other plants will be built to compete with it and this new competition will bring down its earning capacity and therefore its value. But if the plant's earning capacity gives it a value definitely below the cost of reproducing it, new plants will not be built and old ones will wear out. Sooner or later the resulting scarcity of the product will give it a higher value. This will increase the earning capacity and the value of existing plants. These processes will normally keep the value of productive plants *somewhere near the cost of reproduction.*"

Dr. John R. Commons, discussing the evolution of the value concept, says that the enlargement of the view of property from the mere title and possession of things to the exchange value of things under the guidance of the Supreme Court is an outstanding characteristic of the American economy and has had profound consequences.

Other writers discuss the valuation question from judicial, accounting and engineering viewpoints. Authors include Prof. C. O. Ruggles, Judge John F. MacLane, A. J. G. Priest, R. C. Thurston, Jr., M. L. Sindeband, Prof. William D. Ennis, Francis S. Haberly, Dean John T. Madden, Dr. J. Rhoads Foster, Luther R. Nash, Prof. Henry Earle Riggs, Fowler Barker, Sherwin C. Badger, Owen Ely, Dr. Gus W. Dyer and Shelly Pierce.

Personnel of E. E. I. Committees for 1943-1944

Appointments to Edison Electric Institute Committees for the administrative year 1943-1944 have been completed by President Kellogg, and the complete personnel of the committees is printed on this and following pages, with the exception of the Operating Committee which is listed on the inside of the back cover.

ACCOUNTING COMMITTEES

ACCOUNTING EXECUTIVE COMMITTEE

Chairman, F. B. FLAHIVE, Columbia Gas & Electric Corp., New York, N. Y.
H. D. ANDERSON, American Gas & Electric Service Corp., New York, N. Y.
T. W. AYTON, Indianapolis Power & Light Co., Indianapolis, Ind.
G. H. BOURNE, The Commonwealth & Southern Corp., New York, N. Y.
G. F. BRENNER, The Cincinnati Gas & Electric Co., Cincinnati, Ohio.
G. J. BRETT, Niagara Hudson Power Corp., New York, N. Y.
E. L. CASSADY, Indianapolis Power & Light Co., Indianapolis, Ind.
F. L. CHAMBERS, Public Utility Engineering & Service Co., Chicago, Ill.
A. S. CORSON, The United Gas Improvement Co., Philadelphia, Pa.
H. R. FLANEGAN, Philadelphia Electric Co., Philadelphia, Pa.
H. L. GRUEHN, Consolidated Gas Electric Light & Power Co., Baltimore, Md.
C. T. HARMON, Duquesne Light Co., Pittsburgh, Pa.
FRANKLYN HEYDECKE, Public Service Electric & Gas Co., Newark, N. J.
R. P. KAESSHAEFER, American Water Works & Electric Co., New York, N. Y.
DONALD S. KENNEDY, Oklahoma Gas & Electric Co., Oklahoma City, Okla.
C. E. KOHLHEPP, Wisconsin Public Service Corp., Milwaukee, Wis.
J. M. KRAMARSIK, The Connecticut Light & Power Co., Hartford, Conn.
J. H. LOBBAN, The Detroit Edison Co., Detroit, Mich.
A. G. MITCHELL, Philadelphia Electric Co., Philadelphia, Pa.
C. E. PACKMAN, Middle West Service Co., Chicago, Ill.
H. H. SCAFF, Ebasco Services Incorporated, New York, N. Y.
A. H. SCHETTLER, Union Electric Co. of Missouri, St. Louis, Mo.
S. M. SMALLPAGE, New Orleans Public Service, Inc., New Orleans, La.
R. H. SMITH, The Cleveland Electric Illuminating Co., Cleveland, Ohio.
C. P. STAAL, Southern California Edison Co., Ltd., Los Angeles, Cal.
W. H. SWINNEY, West Penn Power Co., Pittsburgh, Pa.
B. C. TAYLOR, The Dayton Power & Light Co., Dayton, Ohio.
H. P. TAYLOR, Wisconsin Public Service Corp., Milwaukee, Wis.
JOHN B. THURSTON, North American Co., New York, N. Y.
R. B. TULPIN, Central Illinois Public Service Co., Springfield, Ill.
P. R. WILLIAMS, Virginia Electric & Power Co., Richmond, Va.
A. ROYAL WOOD, The United Illuminating Co., New Haven, Conn.

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P. J. BRAHENEY, Minneapolis General Electric Co., Minneapolis, Minn.
A. S. BUR, Wisconsin Public Service Corp., Green Bay, Wis.
HERBERT E. CLIFF, Public Service Electric & Gas Co., Newark, N. J.
E. T. COLTON, New Orleans Public Service, Inc., New Orleans, La.
D. C. DAUBMEYER, The Detroit Edison Co., Detroit, Mich.
TRACY FABIAN, The United Illuminating Co., Bridgeport, Conn.
O. E. FLORA, Pennsylvania Power Co., New Castle, Pa.
J. R. GARDNER, Central Hudson Gas & Electric Co., Poughkeepsie, N. Y.
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E. C. HOLDEN, Indianapolis Power & Light Co., Indianapolis, Ind.
E. G. HUCK, The Cincinnati Gas & Electric Co., Cincinnati, Ohio.
HARRY JEFFS, Queens Borough Gas & Electric Co., Far Rockaway, N. Y.
W. R. KEAGY, The Cincinnati Gas & Electric Co., Cincinnati, Ohio.
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F. W. PHELPS, Union Electric Co. of Missouri, St. Louis, Mo.
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W. H. WATERBURY, American Gas & Electric Service Corp., New York.
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B. C. SPRAGUE, West Penn Power Co., Pittsburgh, Pa.
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L. R. NASH, 155 Main St., Ridgefield, Conn.
W. H. WILLIAMS, Public Service Co. of New Hampshire, Manchester, N. H.

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ELMER L. LINDSETH, The Cleveland Electric Illuminating Co., Cleveland, Ohio.
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Guest Members

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COMMERCIAL COMMITTEES

GENERAL COMMERCIAL COMMITTEE

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C. A. COLLIER, Georgia Power Co., Atlanta, Ga.
A. C. CRANDALL, Indianapolis Power & Light Co., Indianapolis, Ind.
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D. M. DEBARD, Stone & Webster Service Corp., New York, N. Y.
F. S. DEWEY, The Cincinnati Gas & Electric Co., Cincinnati, Ohio.
H. E. DEXTER, Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y.
R. T. DUNCAN, The Detroit Edison Co., Detroit, Mich.
R. E. FISHER, Pacific Gas and Electric Co., San Francisco, Cal.
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E. M. COBB, The Ohio Power Co., Canton, Ohio.
A. C. CRANDALL, Indianapolis Power & Light Co., Indianapolis, Ind.
R. E. GALE, Idaho Power Co., Boise, Idaho.
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B. W. REYNOLDS, Pacific Gas and Electric Co., San Francisco, Cal.
H. C. RICE, Southern California Edison Co., Ltd., Los Angeles, Cal.
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ROBERT K. DERRY, The Ohio Power Co., Canton, Ohio.
R. T. DUNCAN, The Detroit Edison Co., Detroit, Mich.
E. C. EASTER, Alabama Power Co., Birmingham, Ala.
R. E. HAYMAN, Oklahoma Gas & Electric Co., Oklahoma City, Okla.
C. E. JEERINGS, Rochester Gas & Electric Corp., Rochester, N. Y.
R. T. JONES, Pennsylvania Power & Light Co., Allentown, Pa.
MORRIS H. LLOYD, Niagara Lockport & Ontario Power Corp., Buffalo, N. Y.
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J. C. SCOTT, Puget Sound Power & Light Co., Seattle, Wash.
H. A. SMITH, Nebraska Power Co., Omaha, Neb.

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MISS ESTHER LEE BRIDE, Union Electric Co. of Missouri, St. Louis, Mo.
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MISS SAMMY BURTON, Mississippi Power & Light Co., Jackson, Mich.
MISS MARY BELLE BURNETT, The Cincinnati Gas & Electric Co., Cincinnati, Ohio.
MISS MARIQUITA DYGERT, The Detroit Edison Co., Detroit, Mich.
MRS. VERA B. ELLWOOD, Wisconsin Electric Power Co., Milwaukee, Wis.
MISS ERNA FISHER, The Hartford Electric Light Co., Hartford, Conn.
MISS ELIZABETH B. MURRAY, Atlantic City Electric Co., Atlantic City, N. J.
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MISS CLARA ZILLESSEN, Philadelphia Electric Co., Philadelphia, Pa.

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ROBERT G. ELY, Public Service Electric & Gas Co., Newark, N. J.
J. H. GUMZ, Pacific Gas and Electric Co., San Francisco, Cal.
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P. D. LAWRENCE, Virginia Electric & Power Co., Richmond, Va.
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C. H. PURDY, Consumers Power Co., Jackson, Mich.
W. T. RICHARDS, Indianapolis Power & Light Co., Indianapolis, Ind.
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J. H. SCOTT, American Gas & Electric Service Co., New York, N. Y.
W. H. STUEVE, Oklahoma Gas & Electric Co., Oklahoma City, Okla.
C. P. YODER, Buffalo, Niagara & Eastern Power Corp., Buffalo, N. Y.

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R. M. BROWN, Indianapolis Power & Light Co., Indianapolis, Ind.
H. B. GOULD, Ohio Edison Co., Youngstown, Ohio.
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PHILIP PEEPLES, Georgia Power Co., Atlanta, Ga.
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H. M. SHARP, Buffalo, Niagara & Eastern Power Corp., Buffalo, N. Y.
L. RAY WEAVER, Philadelphia Electric Co., Philadelphia, Pa.

WIRING COMMITTEE

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PHILIP W. EVANS, Buffalo, Niagara & Eastern Power Corp., Buffalo, N. Y.
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B. Z. SEGALL, New Orleans Public Service, Inc., New Orleans, La.

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ACCIDENT PREVENTION COMMITTEE

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C. B. BOULET, Wisconsin Public Service Co., Milwaukee, Wis.
H. J. BURTON, Consumers Power Co., Jackson, Mich.
F. H. DAVIES, The Detroit Edison Co., Detroit, Mich.
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ROY M. GODWIN, Philadelphia Electric Co., Philadelphia, Pa.
E. E. GROVER, The Columbus & Southern Ohio Electric Co., Columbus, Ohio.
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GEORGE J. RUOFF, Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y.
W. R. SMITH, Public Service Electric & Gas Co., Newark, N. J.
H. F. WEBB, West Penn Power Co., Pittsburgh, Pa.

ELECTRICAL EQUIPMENT COMMITTEE

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H. E. DEARDORFF, The Dayton Power & Light Co., Dayton, Ohio.
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A. G. DEWARS, Northern States Power Co., Minneapolis, Minn.
HENRY A. DRYAR, Philadelphia Electric Co., Philadelphia, Pa.
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H. S. FITCH, West Penn Power Co., Pittsburgh, Pa.
E. S. FITZ, Virginia Electric & Power Co., Richmond, Va.
J. H. FOOTE, The Commonwealth & Southern Corp., Jackson, Mich.
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PHILIP SPORN, American Gas & Electric Service Corp., New York, N. Y.
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STANLEY MOYER, Philadelphia Electric Co., Philadelphia, Pa.
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I. C. STEELE, Pacific Gas & Electric Co., San Francisco, Cal.
E. B. STROWGER, Buffalo Niagara & Eastern Power Corp., Buffalo, N. Y.

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F. E. DAVIS, The Commonwealth & Southern Corp., Jackson, Mich.
EDGAR L. HUGHES, Pacific Gas & Electric Co., San Francisco, Cal.
E. E. KLINE, The Cincinnati Gas & Electric Co., Cincinnati, Ohio.
WALTER G. KNICKERBOCKER, The Detroit Edison Co., Detroit, Mich.
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L. D. PRICE, Public Service Electric & Gas Co., Newark, N. J.
G. B. M. ROBERTSON, Philadelphia Electric Co., Philadelphia, Pa.
J. N. SCHWARTZ, The Columbus & Southern Ohio Electric Co., Columbus, Ohio.
B. Z. SEGALL, New Orleans Public Service, Inc., New Orleans, La.
H. F. SPREEN, Texas Electric Service Co., Fort Worth, Texas.
H. L. THOMSON, The Hartford Electric Light Co., Hartford, Conn.
W. L. WADSWORTH, Northern States Power Co., Minneapolis, Minn.
EDWARD H. WALTON, The United Illuminating Co., Bridgeport, Conn.
C. F. WHITEMAN, The Cleveland Electric Illuminating Co., Cleveland, Ohio.

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C. C. BALTZLY, Philadelphia Electric Co., Philadelphia, Pa.
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S. E. BOWLER, Long Island Lighting Co., Roslyn, N. Y.
F. S. CLARK, Stone & Webster Engineering Corp., Boston, Mass.
C. W. E. CLARKE, United Engineers & Constructors, Inc., Philadelphia, Pa.
SABIN CROCKER, The Detroit Edison Co., Detroit, Mich.
H. M. CUSHING, Buffalo Niagara Electric Corp., Buffalo, N. Y.
G. C. DANIELS, The Commonwealth & Southern Corp., Jackson, Mich.
F. L. DORNBROOK, Wisconsin Electric Power Co., Milwaukee, Wis.
DWIGHT DOUGLASS, The Hartford Electric Light Co., Hartford, Conn.
J. M. DRABELLE, Iowa Electric Light & Power Co., Cedar Rapids, Iowa.
W. V. DRAKE, Monongahela West Penn Public Service Co., Fairmont, W. Va.
W. C. DRUMMOND, Public Utility Engineering & Service Corp., Chicago, Ill.
J. N. EWART, Buffalo Niagara Electric Corp., Buffalo, N. Y.
F. P. FAIRCHILD, Public Service Electric & Gas Co., Newark, N. J.
S. N. FIALA, American Gas & Electric Service Co., New York, N. Y.
G. S. GETHEN, Philadelphia Electric Co., Philadelphia, Pa.
C. Z. GILLIVAN, The Columbus & Southern Ohio Electric Co., Columbus, Ohio.
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J. S. MALOY, West Penn Power Co., Pittsburgh, Pa.
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New Committees on Piping Codes and Standards

THOSE concerned with piping for power plants will be interested in the appointment of two new committees to deal with Code matters concerning power piping. They are (1) Subcommittee on Scope and Intent for the American Standard Code for Pressure Piping, ASA B31.1-1942, and (2) Joint Conference Committee on Piping Codes and Standards.

The personnel and representation of the subcommittee on scope and intent is as follows:

Sabin Crocker, Chairman, Member-at-large on Committee B31*
L. D. Buritt, American Petroleum Institute
C. S. Cole, War Production Board
Alfred Iddles, ASME
C. A. Kelting, Member-at-large on Committee B31**
F. H. Morehead, Manufacturers Standardization Society of the Valve and Fittings Industry
J. H. Williams, National Automatic Sprinkler Association

As the title indicates, this committee has been appointed to handle in a systematic manner requests for explanations and additional information bearing on the scope and intent of the Code for Pressure Piping. Corrections, changes, and extensions of the Code may be recommended by this committee, but they are subject to approval by letter ballot vote of the Sectional Committee. A number of requests for interpretations have been handled by the committee. Inquiries should be addressed to the Chairman in care of the ASME at 29 West 39th St., New York 18, N. Y.

The inter-relation of the American Standard Code for Pressure Piping, ASA B31.1-1942, and the American Standard for Steel Pipe Flanges and Flanged Fittings ASA B16e-1939, with the ASME Boiler Construction Code has been evident for some time since provisions of the three standards are not in entire agreement. Conflicting requirements have been discussed by the Prime Movers Committee, EEI, on several occasions. In order to handle the discussions of subjects of mutual interest to the three groups, a joint conference committee has been appointed composed of representatives of these three groups, and also representatives of the piping-installation contractors.

The members of the committee are as follows:

Code for Pressure Piping

C. A. Kelting, Chairman, Consolidated Edison Co. of New York
Sabin Crocker, The Detroit Edison Company
Alfred Iddles, Babcock and Wilcox Company.

Sectional Committee B16

J. R. Kruse, Combustion Engineering Co.
A. M. Houser, War Production Board
F. H. Morehead, Walworth Company

ASME Boiler Code Committee

V. M. Frost, Public Service of Jersey
E. D. Grimison, Babcock and Wilcox Company
D. B. Rossheim, M. W. Kellogg Co.

Piping-Installation Contractors

F. C. Fantz, Midwest Piping and Supply Co., Inc.
E. P. Everhard, W. A. Pope & Company
J. H. Zink, Heat and Power Corporation

The principal function of the committee as defined so far is to receive and consider points of variance and offer recommendations to the several committees concerning the need and method for eliminating them. The first meeting of the committee was held in New York on June 3 where several of the outstanding differences were discussed, and recommendations formulated for transmission to the three committees. It is urged that discrepancies between the three publications be called to the attention of the joint-committee by addressing a letter to Mr. C. A. Kelting, Chairman, care of the ASME, 29 W. 39th St., New York, N. Y.

* Senior Engineer, Engineering Division, The Detroit Edison Company.
** Asst. Division Engineer, Consolidated Edison Co. of New York.

PERSONALS

J. B. BLACK, president of the Pacific Gas and Electric Company, has announced that the board of directors has appointed P. M. DOWNING, executive vice-president of the company, and A. E. WISHON, vice-president and general manager. Both men are directors of the company.

Mr. Downing has served the company 42 years, during the past fourteen of which he has been vice-president and general manager. In addition to specific assignments, Mr. Downing will assist the president in the general supervision of the company's affairs.

Mr. Wishon has been 34 years in the service of the company and its subsidiaries. He was formerly president of the San Joaquin Light & Power Corporation, now a part of the Pacific System, and for the past thirteen years has been vice-president and assistant general manager of the Pacific Gas and Electric Company.

Mr. Wishon will direct the operation of the company's properties and its relations with its 1,750,000 customers.

The board of directors of Public Service Corporation of New Jersey has created the post of executive vice-president and elected GEORGE H. BLAKE to the new position. Mr. Blake, who joined Public Service in 1910 as a trial attorney, has been vice-president and general solicitor of the corporation and its subsidiaries for the past six years. He has been a director of the corporation since 1934 and a member of the executive committee of the corporation's board of directors since 1935.

Mr. Blake, a graduate of New York University, was admitted to the bar in 1908, and practiced law with Edwards and Smith in Jersey City until 1910. He started with Public Service in that year in Jersey City, was made assistant general solicitor of the corporation and its subsidiaries in 1921 and general solicitor two years later.

HERBERT A. WAGNER has recently resigned as a member and chairman of the board of Consolidated Gas, Electric Light & Power Co. of Baltimore because of the condition of his health. CHARLES M. COHN, president of the company, was elected chairman of the board in addition to being president. Mr. Wagner had been with the company for 35 years, during most of which he served as its president. He was first elected president in 1915, and from 1939 to 1942 he was president and chairman of the board. He resigned the presidency in 1942, continuing as chairman of the board. At that time he was succeeded as president by Mr. Cohn, who since 1931 had been executive vice-president, and who now succeeds him as chairman of the board.

HENRY S. WALKER has been appointed director of research of The Detroit Edison Company. Mr. Walker began as a student in the Detroit Edison Research Department 22 years ago, working his way up through the ranks. He is a graduate of the University of Detroit with the degree of Bachelor of Mechanical Engineering, and is a member of the Engineering Society of Detroit, the American Society of Mechanical Engineers and the Michigan Engineering Society. As director of research, he has charge of the company's research laboratory, which is principally concerned with operating problems designed to reduce costs and improve service, and the company's reference library.

WALTER G. KNICKERBOCKER has been appointed superintendent of meters of the Detroit Company. He had served as assistant superintendent for 14 years. His employment with the company began in the property division, shortly after his graduation in 1916 from Michigan State College as a Bachelor of Science in Electrical Engineering. Mr. Knickerbocker is a member of the Engineering Society of Detroit, the American Institute of Electrical Engineers and the Meter Committee of the Edison Electric Institute.

JOHN A. DARLING, chief of electrical operations in the electrical section of the Boston Edison production department, has been named assistant superintendent of that department. With George C. Eaton, whose appointment as assistant superintendent has been previously noted, he will report to H. W. H. Wellington, superintendent of production, headquarters being at 39 Boylston Street, Boston. Mr. Darling joined the company 42 years ago. He is a past-chairman of the New England System Operators Club.

HENRY L. R. KURTH, for many years assistant chief of electrical operations in Boston Edison's production department, and who has been with the company since 1922, has been appointed chief of electrical operations, succeeding John A. Darling. ANDREW E. GRANT, who has been with Boston Edison for about 36 years, including many years as an engineer in the technical division of the production department, has been appointed assistant chief of electrical operations. ARTHUR W. FERGUSON, a Boston University engineering graduate of 1922, who entered Boston Edison service in that year, and who has been in the industrial relations department for a long period, has been appointed production training engineer.

FRANK T. MCEVOY, resident manager of the Albany district of the New York Power & Light Corp since 1938, has been elected a vice-president of that utility. Mr. McEvoy began his career with the company in 1928 and was made purchasing agent in 1930. His assignment followed eight years later.

STORRS M. BISHOP succeeds Mr. McEvoy as resident manager of the Albany district. He had been resident manager of the Hudson district since 1937. He started with the company in Schenectady in 1926 and was made resident manager at Port Henry in 1930.

O. B. NYE has been transferred to Hudson as resident manager, after having served as resident manager at Port Henry since 1936. Mr. Nye began his work with the company in 1930 and has served in the street lighting and power sales departments. He has been succeeded at Port Henry by PATRICK J. SULLIVAN, sales promotion supervisor at Hudson since 1939. Mr. Sullivan began work with the company at Chestertown in 1925 and has served in the line, engineering and rural service departments.

FRED BERG, assistant superintendent of the Puget Sound Power & Light Co. at Kelso, has been appointed manager to succeed Byron M. Atkins, retired. Mr. Berg has been identified with Puget Sound Power & Light at Kelso since 1925. Mr. Atkins retired after 46 years in the light and power field. Thirty-two of these years he was located in Kelso.

C. J. STRIKE, president and general manager of the Idaho Power Co., has been appointed president of the Idaho War Fund, which includes all the agencies in the state that are seeking funds for war purposes.

RAYMOND G. CARROLL, for the past several years manager of the transportation department of the Virginia Electric & Power Co. at Norfolk, Va., has been transferred to Williamsburg to have charge of all the company's properties in that area. JOHN A. DAVIS, formerly connected with the transportation department of the El Paso Electric Co., El Paso, Tex., has been named to succeed Mr. Carroll in Norfolk.

M. C. WESTRATE, formerly of the engineering department, Commonwealth & Southern Corp., Jackson, Michigan, has resigned to take a position as chief engineer, Communication Equipment & Engineering Co., Chicago.

LYMAN W. ROBINSON has been appointed assistant secretary in charge of plant accounting for the Consumers Power Co., Jackson, Mich., succeeding the late M. Cedric Dowling. Mr. Robinson joined Consumers Power as a junior engineer immediately after graduation from Iowa State College in 1923 and has been employed by that utility and affiliated companies ever since.

WILLIAM H. BALDWIN, assistant to the president of the Jersey Central Power & Light Co., Asbury Park, N. J., and in charge of the company's gas and electric operations, has resigned, effective July 31. Since the war Mr. Baldwin has also been responsible for protection of company property and other defense measures. Mr. Baldwin has been with Jersey Central since 1933 and has had more than 35 years experience in the utility field, serving in New England, the Middlewest and South.

RALPH A. SMITH, chief engineer, Holyoke (Mass.) Water Power Co., has been appointed superintendent of production for the Rockland (N. Y.) Light & Power Co., with headquarters at Middletown, N. Y. He is a graduate of Norwich University and in his early career was employed by the Turners Falls (Mass.) Power & Electric Co., on the construction of Hampden steam plant, and on hydraulic and electric power studies and the operation of the Cabot station.

CONVENTIONS AND MEETINGS

SEPTEMBER

14-16 National Association of Railroad and Utilities Commissioners, Edgewater Beach Hotel, Chicago, Ill.

23 Pennsylvania Electric Association Annual Meeting, Wm. Penn Hotel, Pittsburgh, Pa.

OCTOBER

5-7 32nd National Safety Congress and Exposition of the National Safety Council, Sherman Hotel, Chicago, Ill.

8-9 Accident Prevention Committee, EEI, LaSalle Hotel, Chicago, Ill.

10-11 National Electrical Contractors Association, Hotel Drake, Chicago, Ill.

11-12 Electrical Equipment Committee, EEI, Hotel Cleveland, Cleveland, Ohio

11-12 Prime Movers Committee, EEI, Hotel Cleveland, Cleveland, Ohio.

11-12 Transmission and Distribution Committe, EEI, Hotel Cleveland, Cleveland, Ohio

11-13 American Gas Association, Jefferson Hotel, St. Louis, Mo.

14-15 Electrical Equipment Committee, Pennsylvania Electric Association, Benjamin Franklin Hotel, Philadelphia, Pa.

25-29 National Electrical Manufacturers Association, Waldorf-Astoria Hotel, New York, N. Y.

NOVEMBER

29-30-Dec. 1-3—The American Society of Mechanical Engineers, Pennsylvania Hotel, New York, N. Y.

Utilities Radio Program

THE first broadcast of "Report to the Nation," under the sponsorship of the electric light and power companies, went on the air over a coast-to-coast network of the Columbia Broadcasting System on Tuesday, July 27, and will continue to appear each Tuesday evening.

A present total of 125 power companies are underwriting the program, which is co-ordinated, under the direction of N. W. Ayer & Son, advertising counsel, with the magazine advertising campaign which has been under way for more than a year.

The initial broadcast of "Report to the Nation" was on November 30, 1940, and was confined to informal and factual explanations of governmental activities. Since Pearl Harbor, however, the program was expanded to a 30-minute coverage of world news, using all the resources of the CBS organization, and incorporating famous personalities as guest stars. It was on a sustaining basis until its sponsorship by components of the light and power industry.

From a commercial standpoint, the program brings to the American people facts on the every-day business of producing electricity and the story of the job the industry has done in helping speed war production.

Southern Section, IAEI to Meet in New Orleans

THE fifteenth annual meeting of the Southern Section, IAEI, will be held in New Orleans, September 27, 28, 29, according to the announcement of B. Z. Segall, chairman of the General Committee.

A timely and well-planned program has been arranged, with the concentration of interest centered on the war effort. "The Code Panel discussions in particular," said Chairman Segall, "will deal with war emergency rules and regulations and will provide an excellent opportunity for the exchange of ideas in meeting wartime problems."

Among the highlights of the meeting will be a visit on Wednesday afternoon, September 29, to Higgins Industries, Inc., Gentilly Avenue and Industrial Canal plant.

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Rate Research, F. A. NEWTON, The Commonwealth & Southern Corp., New York, N. Y.

General Commercial, EDWIN VENNARD, Middle West Service Co., Chicago, Ill.

Statistical, W. G. BOURNE, JR., The Commonwealth & Southern Corp., New York, N. Y.

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Codes and Standards (a Subcommittee of the Operating Committee) H. B. BRYANS, Philadelphia Electric Co., Philadelphia, Pa.

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P. L. SMITH ..... Middle West Corporation, Chicago, Ill.
GEORGE N. TIDD ..... American Gas & Electric Company, New York, N. Y.
J. V. TONER ..... Boston Edison Company, Boston, Mass.